

BIODIVERSITY OF PYRGOMORPHID GRASSHOPPERS FROM EASTERN UTTAR PRADESH

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ABSTRACT : Grasshoppers are dominant fauna in tropical and subtropical ecosystem. The biodiversity exploration of pyrgomorphid grasshoppers were made in different district of eastern Uttar-Pradesh and 8 species of 4 different genera from 4 different tribes of family Pyrgomorphidae have recorded for this region. Two species namely, *Atracto morphasinensis* (Bolivar, 1905) and *Pyrgomorpha bispinosa* Walker, 1870 are collected first time from Uttar-Pradesh. *Atractomorphacrenulata* (Fabricius, 1793) was the dominating fauna in whole survey sites and *Poekilocerus pictus* (Fabricius, 1775) have collected from *Jatropa* sp. host also.

Key words : Acridoidea, grasshopper, orthoptera, pyrgomorphidae, Uttar Pradesh.

INTRODUCTION

Grasshoppers belong to order Orthoptera which is the sixth largest insect order after Hemiptera (Alfred, 2003). They are the most diversified fauna of the world having significant economic importance because of their damaging potential. Superfamily Acridoidea divided into several families of which Acrididae, Catantopidae and Pyrgomorphidae are more widely distributed family in India. They are often main invertebrate in the grassland ecosystem as consumers (Curry, 1994). They are characterized by short antennae, prosternum often with tubercle, hind femur adapted for leaping, wings well developed or brachypterous, stridulatory mechanism may or may not be present, tympanal auditory organs normally present on either side at the base of abdomen, arid hind tarsi always three segmented. The numbers of known species of order Orthoptera is over 20,000 species worldwide and about 1,750 species (it's 10 percent of the total worldwide known species) are recorded from India (Tandon and Hazra, 1998). Kirby (1914) and Chopard (1969) are produces major work on Indian grasshopper whereas, 21 genera with 47 species of pyrgomorphids are listed by Shishodia *et al* (2010) from the India, which is very less as compare to other family.

More recently, Nayeem and Usmani (2011 and 2012), Hirdesh and Usmani (2014) have been worked on grasshopper are more remarkable. Certain significant works have been carried out from Uttar-Pradesh on

Orthoptera by Usmani *et al* (2010), Yadav and Singh (2011), Yadav *et al* (2009 and 2014), Akhtar *et al* (2012), Usmani *et al* (2012), Yadav (2016), Akhtar *et al* (2014) and Akhtar and Usmani (2014). There is not a concrete information available regarding biodiversity of the pyrgomorphid from Uttar Pradesh. Hence, present study is carried out from eastern Uttar Pradesh.

MATERIALS AND METHODS

Study area

Uttar Pradesh is the largest northern state of the India. It is located in north side of India, surrounded by Nepal and Uttarakhand on its north, Delhi and Haryana on its north-west, Rajasthan on its west, Madhya Pradesh on its south, Chhattisgarh and Jharkhand on its south east and Bihar on its east but surveys were made only in the districts of eastern part of Uttar-Pradesh namely, Varanasi, Mirzapur, Ghazipur, Mau and Azamgarh. It is characterized by fertile alluvial soil, the river Ganga and the Vindhya hills and the plateau in the south comprise hard rock strata with a varied topography of hills. The major crops cultivated were rice, wheat, barley, pigeon pea, groundnut, sorghum, pearl millet and sugarcane. Temperatures are fluctuating anywhere between 2°C and 47°C in the certain districts. The mean annual rainfall ranges from 650mm in the southwest corner of the state to 1,000 mm in the eastern parts of the state.

Table 1 : Checklist of pyrgomorphid grasshoppers from eastern Uttar Pradesh.

Order	Superfamily	Family	Subfamily	Tribe	Genus	Species
Orthoptera	Pyrgomorphoidea Brunner, 1874	Pyrgomorphidae Brunner, 1874	Pyrgomorphinae Brunner, 1874	Atractomorphiini Bolivar, 1884	<i>Atractomorpha</i> Saussure, 1862	<i>crenulata</i> (Fabricius, 1793) <i>sinensis</i> (Bolivar, 1905)* <i>psittacina</i> (Haan, 1842)
				Chrotogini Bolivar, 1904	<i>Chrotogonus</i> Serville, 1838	<i>oxypterus</i> (Blanchard, 1836) <i>trachypterus</i> (Blanchard, 1836)
				Poekiloceriini Burmeister, 1840	<i>Poekilocerus</i> Serville, 1831	<i>pictus</i> (Fabricius, 1775)
				Pyrgomorphini Brunner, 1874	<i>Pyrgomorpha</i> Serville, 1838	<i>bispinosa</i> (Walker, 1870)* <i>conica</i> (Olivier, 1791)

Note : (*) fauna are added for Uttar-Pradesh.

Table 2 : Distribution of pyrgomorphid grasshoppers from eastern Uttar Pradesh.

Fauna	Occurrence in different district				
	Varanasi	Mirzapur	Ghazipur	Mau	Azamgarh
<i>Atractomorpha crenulata</i> (Fabricius, 1793)	***	***	***	***	**
<i>A. sinensis</i> (Bolivar, 1905)*	**	*	*	*	-
<i>A. psittacina</i> (Haan 1842)	*	**	**	-	-
<i>Chrotogonusoxypterus</i> (Blanchard, 1836)	***	***	***	**	**
<i>C. trachypterus</i> (Blanchard, 1836)	***	**	***	*	***
<i>Poekiloceruspictus</i> (Fabricius, 1775)	***	**	***	**	**
<i>Pyrgomorphabispinosa</i> (Walker, 1870*)	*	-	*	-	-
<i>P. conica</i> (Olivier, 1791)	***	**	**	**	-
Score	19	15	18	11	9

Note : (*) fauna are added for Uttar Pradesh.

Collection and preservation

Grasshoppers were collected by hand and by sweeping using an aerial insect net; the net was used for catching insects individually or by sweeping over crops. The insects caught were transferred to a bottle that containing cotton soaked in ethyl acetate, to kill the specimen. Once killed, the specimen was removed from the bottle to prevent colour change.

Identification

Specimens were first relaxed, rightwings were stretched putting a piece of paper on it (if needed), and pinned by inserting a pin on the posterior right on thorax on a stretching board and left to dry for 72 hours. The specimens were later identified up to species level on the basis of external morphological characters with the help of stereoscopic microscope and keys in available literature and Cigliano *et al* (2017).

Storage

Pinned specimens were kept in storage boxes and cabinets, with naphthalene balls to prevent decomposition. Wet specimens were stored in 70% ethyl alcohol in plastic

vials.

RESULTS AND DISCUSSION

In present study, after an intensive survey was made in different cropping system in different districts of eastern Uttar-Pradesh and 8 species of 4 different genera from 4 different tribes of family Pyrgomorphidae have recorded for this region (Table 1). Two species namely, *Atractomorpha sinensis* (Bolivar, 1905) and *Pyrgomorpha bispinosa* Walker, 1870 are collected first time from Uttar Pradesh. *Poekiloceruspictus* (Fabricius, 1775) have collected from a new host, *Jatropha* sp. from this region. Four species of family Pyrgomorphidae were recorded from Varanasi region by Yadav and Singh (2011) collected for this region. *Atractomorpha crenulata* (Fabricius, 1793), *Chrotogonus oxypterus* (Blanchard, 1836), *C. trachypterus* (Blanchard, 1836), *Poekiloceruspictus* (Fabricius, 1775) and *Pyrgomorpha conica* (Olivier, 1791) have been reported earlier from Uttar Pradesh (Shishodia *et al*, 2010). The highest diversity of pyrgomorphid fauna were found in Varanasi and Ghazipur District. *Atractomorpha crenulata* (Fabricius, 1793) was dominating in all survey localities. Shishodia *et al* (2010)

Table 3 : Distribution of pyrgomorphid grasshoppers.

Fauna	Known Distribution	
	India	Elsewhere
<i>Atractomorpha crenulata</i> (Fabricius, 1793)	Andaman and Nicobar Island, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Goa, Gujarat, Haryana, Jammu and Kashmir, Jharkhand, Karnataka, Kerala, Lakshadweep Island, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Orissa, Punjab, Rajasthan, Uttar-Pradesh, Sikkim, Tamil Nadu, Tripura, Uttarakhand, West Bengal	Bangladesh, Cambodia, Laos, Maldives Island, Malaya, Myanmar, Nepal, Pakistan, Sri Lanka, Sumatra, South Vietnam and Thailand
<i>A. sinensis</i> (Bolivar, 1905)*	Jammu Kashmir, Uttar-Pradesh*	Japan, Vietnam, Korea, China
<i>A. psittacina</i> (Haan 1842)	Arunachal Pradesh, Assam, Meghalaya, Uttar-Pradesh, Rajasthan, Tripura and West Bengal	Borneo, Malaysia
<i>Chrotogonus oxypterus</i> (Blanchard, 1836)	Andhra Pradesh, Bihar, Chhattisgarh, Goa, Karnataka, Kerala, Maharashtra, Uttar-Pradesh, Orissa, Tamil Nadu, West Bengal	Bangladesh, Sri Lanka
<i>C. trachypterus</i> (Blanchard, 1836)	Andhra Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Gujarat, Haryana, Jammu and Kashmir, Himachal Pradesh, Madhya Pradesh, Maharashtra, Uttar-Pradesh, Uttarakhand, Tamil Nadu, Sikkim, Orissa, Punjab, Rajasthan, Meghalaya	Bangladesh, Nepal, Pakistan, Afghanistan, Iran
<i>Poekiloceru spictus</i> (Fabricius, 1775)	Andhra Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Gujarat, Himachal Pradesh, J&K, Karnataka, Madhya Pradesh, Orissa, Rajasthan, Uttar-Pradesh and West Bengal	Bangladesh, Nepal, Pakistan, Afghanistan
<i>Pyrgomorpha spinosa</i> (Walker, 1870*)	Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Orissa, Tamil Nadu and Uttar Pradesh*	
<i>P. conica</i> (Olivier, 1791)	Andhra Pradesh, Karnataka, Rajasthan, West Bengal, Uttar-Pradesh	North and West Africa, South Europe, and west Sia

Note : (*) fauna are added for Uttar Pradesh.

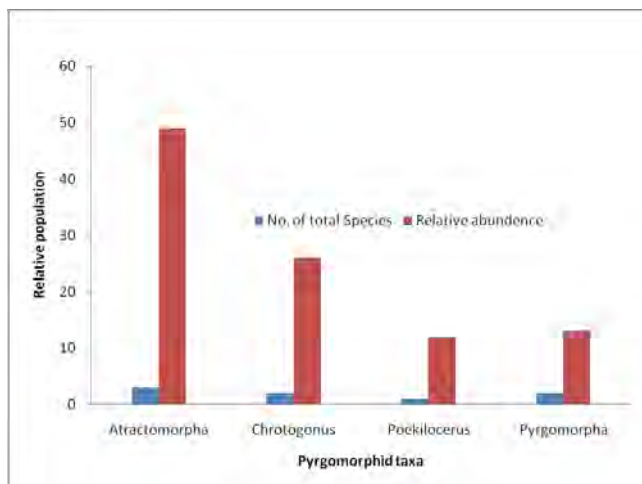


Fig. 2 : Generic distribution of pyrgomorphid fauna.

have also mentioned maximally to this fauna. Shbbir and Rastogi (2013) recorded 7 species of 4 genera of pyrgomorphid from Northern Coal Mine Limited.

During the present investigation different pyrgomorphid genus identified and present data revealed that *A. crenulata* (Fabricius, 1793) (36.2%), *A. sinensis* (Bolivar, 1905) (0.9%), *A. psittacina* (Haan, 1842) (5.4%), *Chrotogonus oxypterus* (Blanchard, 1836)

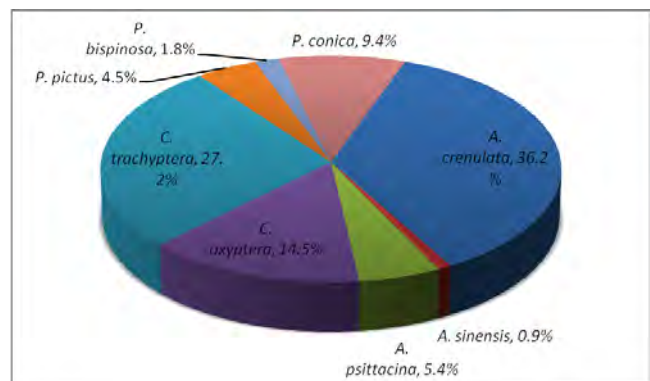


Fig. 2 : Population diversity of pyrgomorphid fauna.

(14.5%), *C. trachypterus* (Blanchard, 1836) (27.2%), *Poekiloceru spictus* (Fabricius, 1775) (4.5%), *Pyrgomorpha conica* (Olivier, 1791) (9.4%) and *P. bispinosa* Walker, 1870 (1.8%). Most diversified pyrgomorphid fauna was the *A. crenulata* (Fabricius, 1793) in all survey sites. Prabhakar (2015) recorded 384 species of Orthoptera is a record collection from Tamil Nadu.

CONCLUSION

Results of present study indicate that further more studies are required for documenting pyrgomorphid

communities in different ecosystems of Uttar Pradesh, India. There is a great need of additional research on these environmentally important and most successful fauna.

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