

Short Communication

Diversity and Ecobiogeography of Tettigoniids (Tettigonoidea:Orthoptera) in North Gujarat

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Biodiversity is a popular way of describing diversity of life on earth and is important for overall health of the ecosystem. Among insects, grasshoppers have always been of great interest to man and ecologists because of their direct competition with man and his domesticated animals for food and fodder. In natural communities orthoptera often constitute an important group of arthropods in terms of diversity, biomass and extent of damage they cause to plants. They form a dominant group of herbivorous insects found throughout the world and their high diversity, functional importance, sensitivity to disturbance and ease of sampling make them potentially useful bioindicators for land management. Knowledge of insect biodiversity is essential for their control and also for successful management of our agricultural system and understanding arthropod biodiversity *vis-à-vis* plant diversity is very vital to develop sound Integrated Pest Management strategies.

The geographical distribution of species is an important aspect of faunistic research. Zoogeography explains the structure and exact distribution of species. The distribution of economic species helps in understanding changing pattern of pest status in different parts of the region and also help in analyzing the causes of outbreaks, population build-up in a particular area at a particular time, thereby planning for an effective management strategy. Due to various anthropological activities, many species are restricted to certain pockets or are disappearing. So it is essential to conserve them for which a detailed inventory is a prerequisite. Hence present study embodies the diversity and distribution of long horned grasshoppers of north Gujarat.

The diversity status of Tettigoniids was ascertained by extensive survey and sampling

conducted during 2002-04 at 51 sites in north Gujarat (42 agricultural fields, 6 forest lands and 3 grasslands). The sampling was done by "catch per unit time method" (Sanjayan *et al.*, 1994). Minimum four visits were made in each locality to confirm the presence of the species. The presence of individual species was marked on the map, to show its geographical distribution as per methodology given by Parihar (1984). The distribution index (DI) of various species encountered during the survey was calculated by the formula:

$$DI = \frac{\text{No. of sites in which species was collected}}{\text{Total sites surveyed}}$$

The collected specimens were identified using pertinent literature (Naskrecki and Otte, 1999) and later confirmed with experts from G.S. Gill Research Institute, Gurunanak College, Vellacherry, Chennai. The unidentified, morphologically similar species were separated out and referred to as Recognizable Taxonomic Units (RTU) as per Gadagkar *et al.* (1990).

The species active in different ecosystems and their distribution indices are given in Table 1. The survey indicated the presence of 12 species of Tettigoniidae, distributed among five subfamilies viz., Conocephalinae, Mecopodinae, Phaneropterinae, Pseudophyllinae and Listrocelidinae. All subfamilies were represented by two species each except, Listrocelidinae, which was represented by only one member. The taxonomic position of three species was not established. There was a great variation among the taxonomic groups present in different habitats. The forest ecosystem supported the maximum number of species (8) followed by agroecosystem (5), whereas, the grassland ecosystem contained the least number of Tettigoniid species (3). Among the subfamilies of Tettigoniidae, forest ecosystem supported two species each of Mecopodinae,

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Table 1. Diversity and distribution index of tettigoniids of north Gujarat

Species	Subfamily	Agro ecosystem	Forest ecosystem	Grassland ecosystem	Distribution index
<i>Conocephalus maculata</i> (Le Guillou)	Conocephalinae	+	+	+	0.63
<i>Euconocephalus incertus</i> (Walker)	Conocephalinae	+	-	-	0.29
<i>Mecopoda elongata</i> (Linnaeus)	Mecopodinae	-	+	-	0.08
<i>Mecopoda</i> sp.	Mecopodinae	-	+	-	0.04
<i>Elimaea</i> (<i>Orthelimaea</i>) <i>securigera</i> (Brunner)	Phaneropterinae	+	+	-	0.29
<i>Trigonocorypha unicolor</i> (Stall)	Phaneropterinae	+	+	-	0.45
<i>Sathrophyllia fuliginosa</i> (Stall)	Pseudophyllinae	-	+	-	0.08
<i>Sathrophyllia rugosa</i> (Stall)	Pseudophyllinae	-	+	-	0.10
<i>Hexacentrus annulicermis</i>	Listrocelidinae	-	-	+	0.04
RTU-1 (Forest)		-	+	-	0.06
RTU-2 (Banni)		-	-	+	0.06
<i>Schizodactylus monstrosus</i>		+	-	-	0.04
Total		5	8	3	

Presence +; Absence -.

Phaneropterinae and Pseudophyllinae, whereas, no species belonging to subfamily Listrocelidinae was found in this area. The representation of Tettigoniidae was also poor (12%) in grassland ecosystem as only one species each of the subfamilies conocephalinae

and listrocelidinae could be observed during survey as the species composition differed greatly according to habitats.

Among different species, *Conocephalus maculata* was the most prevalent in the region, indicated by the highest DI (0.63), followed

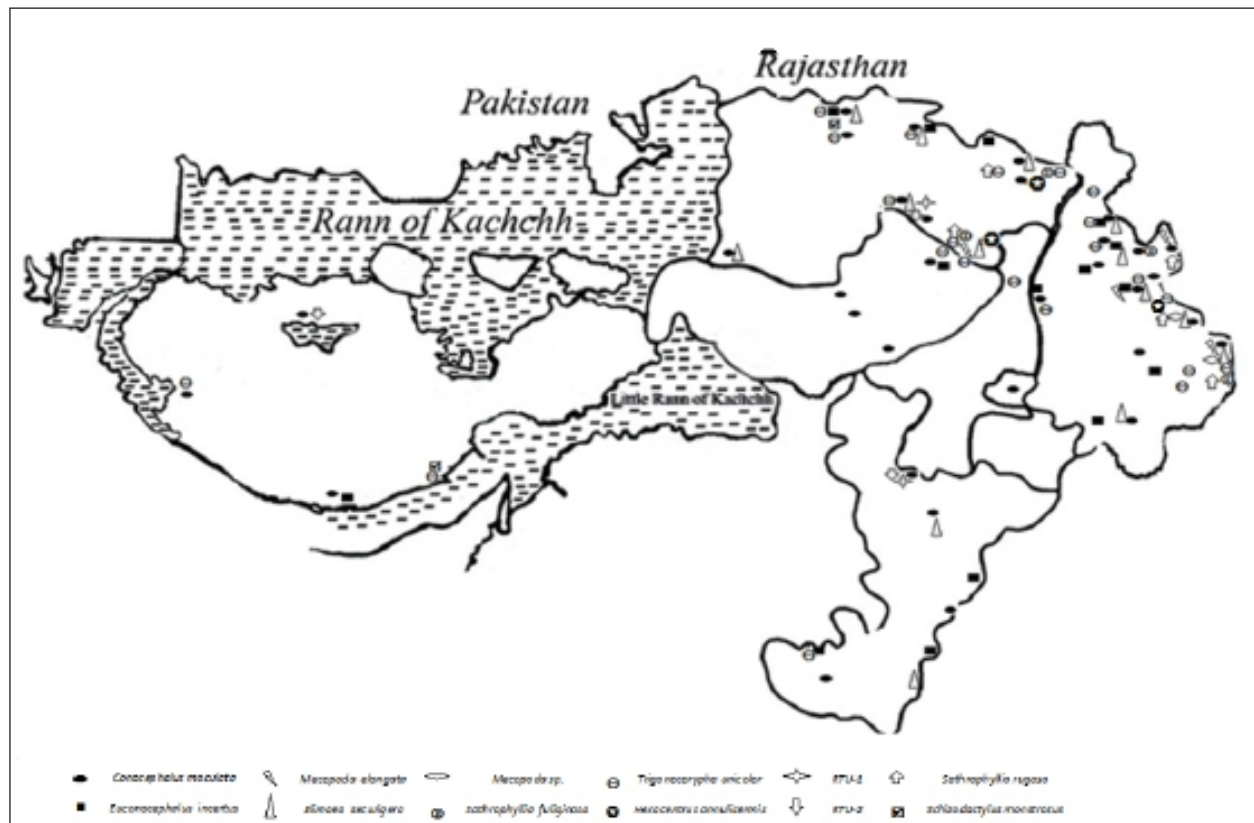


Fig. 1. Ecobiogeography of tettigoniids of north Gujarat.

by *Trigonocorypha unicolor*, which existed in 45% of the sites under survey. The former was observed in all three habitats. Species, *Euconocephalus incertus* and *Elimaea securigera* were distributed in 29% of the sites. *Mecopoda* sp., *Hexacentrus annulicermis* and *Schizodactylus monstrosus* were the least distributed species, which represented only 4% of the area under survey. The distribution of the Tettigoniids varied greatly as it was perhaps influenced by the vegetation and climatic factors. The present study revealed that in north Gujarat, forest ecosystem supported maximum number of Tettigoniids, where as in grassland the diversity was minimum. No published information is available in the form of inventory to support the present status of Tettigoniids of Gujarat, hence, the list of identified grasshoppers mentioned here form the first report from the Gujarat. Parihar (1984) recorded 27 species of grasshoppers from Rajasthan desert, through survey and sampling and prepared the biogeography of these species. Kang and Chen (1994) studied the biocogeography of the grasshopper fauna including 150 species in Inner Mongolia of which 15 species were responsible for agricultural damage. Muralirangan *et al.* (2004) reported 26 species of Tettigoniidae belonging to six subfamilies from different habitats of Tamil Nadu. Hence, it is very clear that the existence of species vary greatly in

different geographical regions and ecosystems and the distribution of a species depends upon the landscape and climatic conditions

References

- Gadagkar, R., Chandrashekara, K. and Nair, P. 1990. Insect species diversity in the tropics: Sampling methods and a case study. *Journal of Bombay Natural History Society*, 87(3): 337-353.
- Kang, L. and Chen, Y.L. 1994. Trophic niches of grasshoppers within Steppe ecosystem in Inner Mongolia. *Acta Entomologica Sinica*. 37: 178-189. (In Chinese with English summary).
- Muralirangan, M.C., Sanjayan, K.P., Prakash, R. and Saravanakumar, V. 2004. *Dynamics of the Orthopteran Community of Tamil Nadu: A Study in Biodiversity*. Final Technical Report, Submitted to Ministry of Environment and Forests. G.S. Gill Research Institute, Gurunanak College, Chennai, 33 p.
- Naskrecki, P. and Ottee, D. 1999. *An Illustrated Catalog of Orthoptera* Vol. I. Tettigoniidae (CD ROM). The Orthopterists Society at the Academy of Natural Sciences of Philadelphia, Publications on Orthopteran Diversity.
- Parihar, D.R. 1984. Eco-biogeography of grasshoppers in Indian Desert. *Zoologische Jahrbuecher Systematic*. 111: 219-230.
- Sanjayan, K.P., Muralirangan, M.C., Suresh, P., Suresh Chand, D. and Albert, S. 1994. Insect diversity in a natural scrub jungle vegetation of Nanmangalam Reserve Forest, Tamil Nadu. *The Entomologist* 114(3&4): 179-194.