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Biodiversity and Biogeography of Praying Mantids in Sindh

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Abstract: The study was undertaken to see the biodiversity and biogeography of Praying Mantids (Mantodea) belonging to families, Eremiaphilidae, Empusidae and Mantidae. Praying mantids were collected from 20 districts of Sindh Province during year 2010 and 2011. Total 380 specimens and 13 species including 2 new records were recorded. Species richness, Biodiversity Index and Index of diversity was determined.

Keywords: Biodiversity, Biogeography, Mantodea, Praying Mantids, Sindh.

1. INTRODUCTION

Biodiversity refers to all the forms of biological entities inhabitating the Earth-including prokaryotes, wild plants and animals, micro-organisms, domesticated animals and cultivated plants, and even genetic material like seeds and germplasm Kothari (1992). Study on biodiversity of insects is of great importance because more than half of the world's known animal species are insects Wilson (1992). Biogeography is the study of patterns in the distribution of life and the processes that underlie these patterns Lomolino *et al*. (2006). Praying mantids (Mantodea) is a small insect group consists of 14 families, 446 genera and 2452 species in the world Otte and Spearman (2005). They are all predators feeding on variety of small animals mainly on other insects Preston (1990); Ehrmann, (1992); Prete *et al.* (1999); Khokhar and Soomro (2009). They are diurnal live in tropical and subtropical regions but few are reported from cold areas Ehrmann (2001). They are solitary live on trees, shrubs, grasses and wear cryptic colors which resemble leaves, flowers, stick or bark of trees to blend surrounding for avoiding enemies Hessler *et al.* (2008). The camouflage facilitates them easy approach to their prey. Being predators they are very important for the studies concerning the bio-control and pest management because many of the insects consumed by them are crop pests. Sindh is an agricultural province of Pakistan and it has favorable geographical conditions for the growth of praying mantids fauna. There are 21 species reported by different workers. This survey was carried out from 20 selected districts and a comparative account on biodiversity and biogeography of 13 species including 2 new record of praying mantids is known. From previous record, some species cold not be found, it may be due to use of pesticides and other chemical sources.

2. MATERIALS AND METHODS

Total numbers of 380 specimens were collected and processed by standard entomological methods. Specimens stored in standard entomological boxes with labels showing locality, date of collection and collector's name. Naphthalene balls were placed in boxes to prevent the attack of ants and other insects. Identification of specimens done with the help of keys and descriptions given by Soomro *et al*. (2002) and by Ehrman's (2002) compressive catalogue of the mantids of the world. Observations on the feeding habits were determined on live mantids in open fields early in the morning after locating the species and quietly watching their feeding for about 2 to 4 hours. Photographs captured by digital camera. The data collected was also used to calculate species richness and biodiversity index using the following equations. Species Richness, $R = s/\sqrt{N}$, here R = species richness, s = number of species recorded and N = total number of individuals collected of all species. Biodiversity Index, $D = (n/N)^2$, here, D = biodiversity index, n = the total number of specimens of a particular species and N = the total number of organisms of all species and Simpson index of diversity, S=1-D, S= Simpson Index of diversity and D= biodiversity index.

3. RESULTS AND DISCUSSION

A total 380 specimens representing 13 mantids species were collected during the year 2010 and 2011, including two new records are recorded first time from Sindh. And two species could not be identified as all of them were nymphs. Besides the distribution of previously recorded species has been extended to new localities. Results show species richness within habitat biodiversity of mantid population is high at the places where their no tillage, no pesticides spray, and no biannual cultivation.

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Table: 1. Distribution of Praying Mantids in Twenty Districts of Sindh Province

Families/ Name of Species	KT	TH	HY	DD	BD	MK	UK	TK	SG	NS	NF	KM	SK	GK	LK	SP	JA	TA	MT	TM	# sp.
EREMIAPHILIDAE																					
**Humbertiella affinis*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	3
H. indica	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	+	-	18
EMPUSIDAE																					
Blepharopsis mendica	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	23
Empusa unicorms	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	32
**Empusa penicornis*	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	9
MANTIDAE																					
Aethalochroa affinis	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	25
Iris radians	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	8
Mantis religiosa akbari	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	17
Mantis religiosa religiosa	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	67
Microthepsis sinthensis	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	+	+	+	+	+	25
Sphodromantis transcaucasica	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	60
Tenodera attenuata	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	88
**Statilia maculata*	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	5
Total Specimens of Praying Mantids																					**380**

Note: Plus (+) sign indicates Presence of Species and Minus (-) sign indicates Absence of Species

(*) sign indicates New Record from Sindh

Abbreviations used:

KT	Kotri	UK	Umar Kot	SP	Shikarpur	BD	Badin	TM	Tando Mohd Khan
TH	Thatta	TK	Tharparkar	JA	Jaccobabad	MK	Mirpurkhas	# sp	Total Number of Specimens
HY	Hyderabad	SG	Sanghar	TA	Tando Allahyar	GK	Ghotki		
DD	Dadu	NS	Nawabshah	MT	Matyari	LK	Larkana		

Table: 2. Number Of Specimen Collected In 2010 And 2011, Species Biodiversity Index And Simpson's Index Of Biodiversity.

S #	Name of Species Recorded	Number of Individuals			B. Index	S. I. D.
		2010	2011	Total		
1	*Humberticlla affinis*	3	0	3	0.00006	0.999
2	*H. indica*	13	5	18	0.00223	0.997
3	*Blepharopsis mendica*	10	13	23	0.00366	0.996
4	*Empusa unicorms*	21	11	32	0.00708	0.992
5	*Empusa penicornis*	7	2	9	0.00055	0.999
6	*Aethalochroa affinis*	18	7	25	0.00431	0.995
7	*Iris radians*	5	3	8	0.00044	0.999
8	*Mantis religiosa akbari*	7	10	17	0.00199	0.998
9	*Mantis religiosa religiosa*	41	26	67	0.03108	0.968
10	*Microthepsis sinthensis*	20	5	25	0.00431	0.995
11	*Sphodromantis transcaucasica*	39	21	60	0.0249	0.975
12	*Tenodera attenuata*	58	30	88	0.05365	0.946
13	*Statilia maculata*	3	2	5	0.00017	0.999
	Total Number of Praying Mantids	**245**	**135**	**380**		
	Species richness from Sindh province				**0.666**	

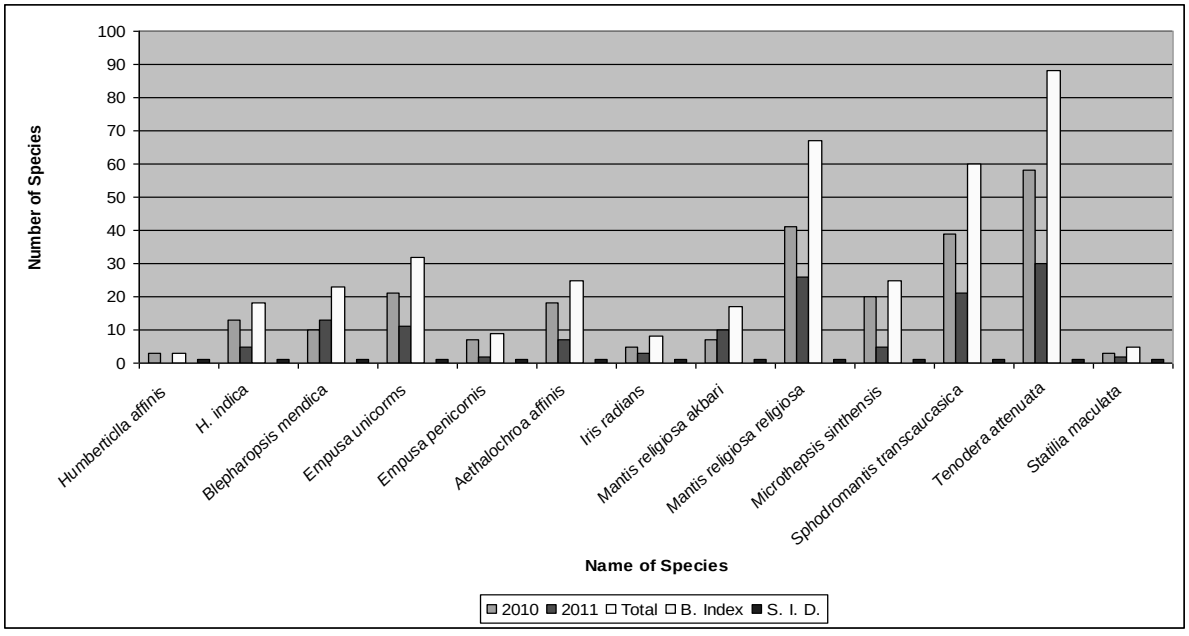


Fig.1. Comparison of 2010 and 2011collection, Biodiversity Index and Simpson's Index of Biodiversity of Praying Mantids

While in cultivated areas species richness decreases due to the use of pesticides, fertilizers and biennial cultivation. It is observed that few species also disappeared which were previously reported. Each species has its own micro habitat where they live successfully due to their camouflage for instance *Humbertiella indica* live and feed on the bark of trees. *Tenodera attenuatta* live and feed upon the bushes. *Mantis religiosa* and *Mantis religiosa akbari* are commonly found in the old bushes and grasses, some species feed in the bottom of the bushes as *Iris radians* and *Aethalochroa affinis*, *Sphodromantis transcausica* commonly found upon small plants and some time on the ground and rarely come at the places where at night search light shines. Each species has its niche and concurrence is absent. Districts Hyderabad, Dadu, Matiari, Tando Allehyar and Tando Muhammad Khan are rich and show high Biodiversity Index of praying mantids fauna and species *Mantis religiosa religiosa*, *Sphodromantis transcaucasica* and *Empusa unicorms* (**Table: 1, 2 and Fig. 1)**. The result of praying mantids biodiversity indicates that the biodiversity of praying mantids fauna in Sindh is high but not stable except for few species. Over all species richness of praying mantids in Sindh is calculated as 0.666 some species show high ratio over the other Table 2, Fig.1. The present study will help in efficient biological control against the agricultural pests. Through this work, people associated with agriculture, especially plant protection and pest management. They will get help toward an efficient application of the biological control against the insect pest.

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