



Sustainability of spiders in Temperature variation at Shoolpaneshwar wild-life sanctuary, Gujarat, India

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Abstract

Spiders are sensible towards the external temperature known ectothermic. The study observed the richness of spiders' species at Narmada riverside habitat, the observation data mainly collected from arboreal and ground habitat included rocks and grass land. This gives rise enormous results to behavioral characteristic of spiders. The major difference found in richness of spider fauna during the three prime seasons in Gujarat. The major families are found abundant in monsoon and winter seasons during July to March. The Salticidae and Gnaphosidae are become low populated during late winter. The two families Araneidae and Lycosidae are found sustained in the summer season during April to June.

Keywords: Richness, araneidae, lycosidae, salticidae, gnaphosidae.

Introduction

Spiders are great feeders with high species richness in most of ground habitat, and they play a significant role in the structure of food webs and community hierarchy, both as number of individuals and as consumers they identified as nocturnal predators¹. These features make them perfect creature as ground predators among their kind of community. Taxonomical studies of spiders have been accessible in the past, mainly concerning the relationships between taxonomically distinct groups of spider species in regions in which problems on spider taxonomy are more or less resolved. Study of species composition and distribution in central Gujarat is carried out in Narmada District².

Study sight: The shoolpaneshwar wild life sanctuary is one of the greenest forests in the Gujarat because it is influenced by Narmada River. This habitat is covered first time where as some of part of Gujarat have been studied like Bhavanagar, Dang, Jassor wild life sanctuary³. It is situated between longitudes 73°79' E and latitudes 21° 76' North. I have selected main study area like Rocky region of river side hill rocky area. It also contains more forest and hilly habitats. Near Sardar Sarovar is the highest peak at the bank of Narmada.

Material and Methods

The sampling methods were used during collections and observations are adopted according to the habitat of spiders. The methods named arboreal, twig striking, ground and sweep have been extensively used in similar protocols rest of the collections and observation are made random in case of sudden appearance of spiders.

Arboreal: This method consisted in collecting all spiders found three to four feet above ground-level by hand, forceps and immediately transferring to collecting vial.

Twig striking: With the help of wooden pole according to the height of tree was used for beating the branches, as high as I could be reached. The effective time included all the time spent in the activity, like beating and searching for fallen spiders on the square sheet.

Ground: Similar to the arboreal method, but it concentrated on all spiders seen a ground level, including those in hidden sites such as below stones, soil or inside hollow trunks.

Sweep – I used a handy sweep net with a diameter of 50 cm, 70 cm deep and with a handle. Only bushes and tall herbs were swept. All time spent sweeping or searching for displaced spiders.

Sampling Time: Sampling was carried out during March 2010 to February 2011; however, most work was done from March to June, July to October and November to February in three basic seasons. This timeframe was chosen because these are the most species-fluctuations part of the year in the sanctuary. Most of the samples were taken during May 1 and 2 and May 8 and 9, June 26 and 27 and July 3 and 4. Each collector carried out two day and two evening. The day samples were carried out between 08:00 to 11:00 hrs and 14:00 to 16:00, the evening samples between 18:00 and 20:00 h. torches and ultraviolet torch were used for evening collection. Two collectors were chosen for this purpose. The samples were preserved in 70% alcohol in the field.

Identification of Spiders: The detailed examination for identification of spiders, a stereoscopic microscopic-model "Technival" (Carl Zeiss, Jena, Germany) with eye pieces 10X, and 25X, and objectives of 0.6X, 1.0X, 1.6X, 2.5X and 4 X magnifications was used. The adult spiders were identified on species level and others on genus or family level using available

literature^{4,1} Data were prepared for each season with detailed information on the occurrence of mature male, female and juvenile spiders.

Results and Discussion

Phonological analysis: The yearly spider activity in the study area is shown in tables and figures. Two peaks of activities occur, one in summer (from March to June) and one (slightly higher) in late monsoon (September). Monthly variations in activity are mainly influenced by the activity of males. When mature, males become very active in the effort to find a mate. Therefore, the great number catches are indicative of the time of reproduction⁵.

The October and November peak is produced both by male and female individuals, though the late monsoon peak is formed mainly by the male activity. Immatures are more abundant during October, November and December⁶, indicating that the reproductive period of most of the spiders is in the august and September even cocoons are found abundant. When referring to the seasonal activity on a family level, three basic patterns are apparent, formed by the three dominant families, Araneidae, Lycosidae and Salticidae.

These families are found more active in throughout the year¹. Clubionidae and Gnaphosidae are also sought their present with low activities. In May (males and females) and September (nearly only males), while during the winter they are almost exclusively represented by immature individuals and some females of the genus Scytodiidae and Thomisidae. In October, November, December and January all the families are found active Araneidae, Lycosidae Salticidae and Theridiidae are the most abundant species, forming the main pattern of activity of the family, while Oecobiidae, Oonopidae, Oxyopidae, Pholcidae and Pisauridae are found very less active throughout the year and during the month of May they entirely disappeared where as Oecobiidae being active only during August and October to January.

The families Araneidae and Lycosidae are consistence active even in hot summer during April and May. Salticidae is also show sustainability in April but it fall down in May. The Araneidae are found with different habitat in leaf web, orb web on rocks, on shrubs. Near river rocks and Zarvani fall it found high populated (figure-1) where moisture level is higher than other habitat⁷. Oonopidae, Tetragnathidae and Uloboridae are found entire disappear during May to June, where as Oecobiidae, Oxyopidae, Pisauridae, Uroctedidae and Zodariidae are found very low populated during these span of months. In Gujarat late May is the hottest month with very less humidity (IMD) which adverse climate for spiders. As discussed earlier except Araneidae and Lycosidae all families are found very low populated or absent.

Table-1
Genera and Species collected from Study site: January to April

Sr. No.	Name of Family	Number of Genera	Number of species
1	Araneidae	12	16
2	Clubionidae	03	04
3	Eresidae	01	02
4	Gnaphosidae	07	07
5	Heteropodidae	04	05
6	Lycosidae	04	10
7	Oecobiidae	01	01
8	Oonopidae	02	02
9	Oxyopidae	02	04
10	Pholcidae	02	02
11	Pisauridae	01	01
12	Salticidae	08	10
13	Scytodiidae	01	01
14	Tetragnathidae	01	02
15	Theridiidae	04	06
16	Thomisidae	06	08
17	Uloboridae	01	02
18	Uroctedidae	01	01
19	Zodariidae	02	02
Total		63	86

Table-2
Genera and Species collected from Study site: May to August

Sr. No.	Name of Family	Number of Genera	Number of species
1	Araneidae	11	14
2	Clubionidae	03	03
3	Eresidae	01	01
4	Gnaphosidae	06	04
5	Heteropodidae	03	02
6	Lycosidae	03	08
7	Oecobiidae	01	01
8	Oonopidae	00	00
9	Oxyopidae	01	01
10	Pholcidae	01	02
11	Pisauridae	01	01
12	Salticidae	02	03
13	Scytodiidae	01	01
14	Tetragnathidae	00	00
15	Theridiidae	02	01
16	Thomisidae	01	01
17	Uloboridae	00	00
18	Uroctedidae	01	01
19	Zodariidae	01	01
Total		43	47

Table-3
Genera and Species collected from Study site: September to December

Sr. No.	Name of Family	Number of Genera	Number of species
1	Araneidae	12	16
2	Clubionidae	03	04
3	Eresidae	01	01
4	Gnaphosidae	06	05
5	Heteropodidae	04	04
6	Lycosidae	04	09
7	Oecobiidae	01	01
8	Oonopidae	01	01
9	Oxyopidae	02	01
10	Pholcidae	02	01
11	Pisauridae	01	01
12	Salticidae	08	09
13	Scytodiidae	01	01
14	Tetragnathidae	01	01
15	Theridiidae	03	02
16	Thomisidae	06	07
17	Uloboridae	01	02
18	Uroctedidae	01	01
19	Zodariidae	01	02
Total		59	69

Table-4
Individuals collected from study site

Family	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Araneidae	256	309	279	240	250	274	289	382	301	409	298	280
Clubionidae	32	21	12	2	1	1	4	19	32	23	12	11
Eresidae	4	2	0	0	0	1	5	2	6	4	5	7
Gnaphosidae	12	33	34	11	2	11	11	17	21	20	12	19
Heteropodidae	13	11	9	0	0	9	10	18	19	18	15	10
Lycosidae	111	198	160	190	170	198	186	188	176	167	179	109
Oecobiidae	1	0	0	0	0	0	0	2	0	1	1	1
Oonopidae	2	4	2	1	0	0	0	0	3	2	1	0
Oxyopidae	9	8	9	0	0	1	0	1	2	2	1	1
Pholcidae	2	4	0	0	0	2	1	2	1	1	2	1
Pisauridae	2	1	0	1	0	0	0	2	2	1	1	2
Salticidae	45	34	67	43	10	8	7	23	34	53	67	54
Scytodiidae	10	11	10	9	1	1	1	9	6	8	10	9
Tetragnathidae	4	6	7	2	0	0	0	0	1	2	3	1
Theridiidae	11	10	14	1	0	2	4	18	17	21	22	21
Thomisidae	23	19	18	10	7	0	0	3	7	11	11	10
Uloboridae	9	7	9	0	0	0	0	0	9	11	9	8
Uroctedidae	2	2	1	0	0	0	0	1	3	3	1	3
Zodariidae	5	4	8	1	0	1	0	0	5	3	5	6
Total	582	684	639	511	441	509	518	687	645	760	655	553

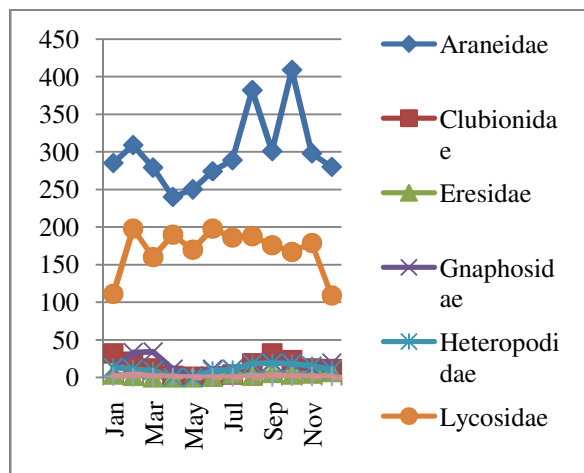


Figure-1
Individuals per Family

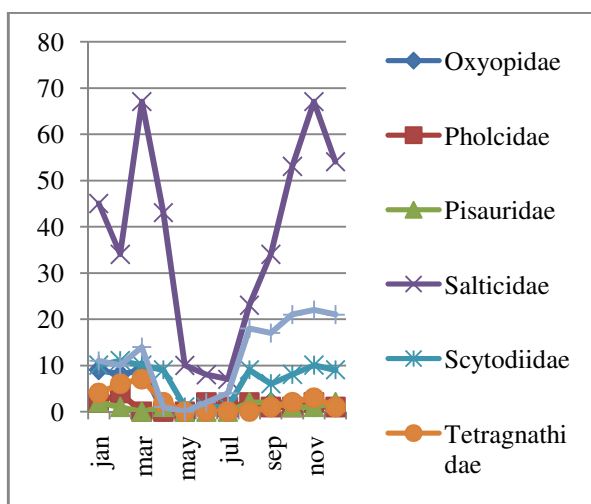


Figure-2
Individuals per Family

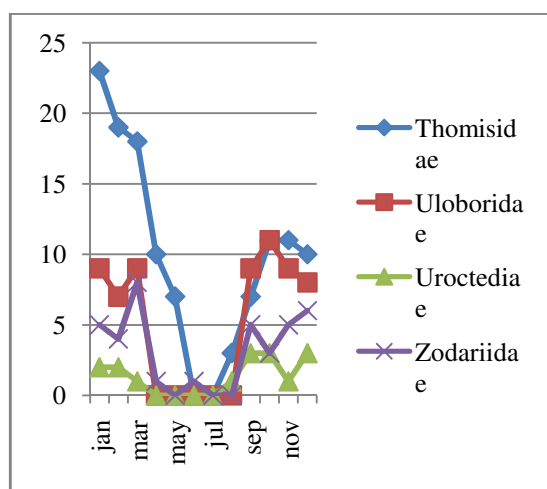


Figure-3
1 individual per Family

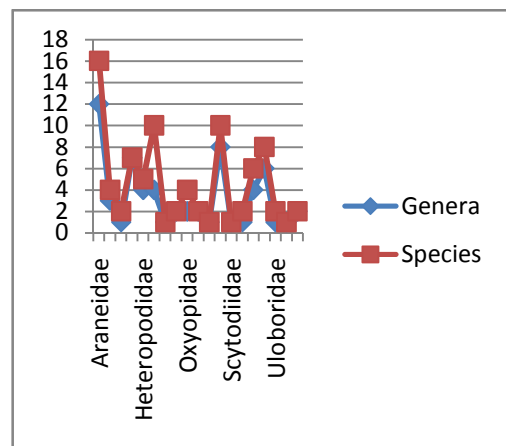


Figure-4
Genera and Species during Jan-April

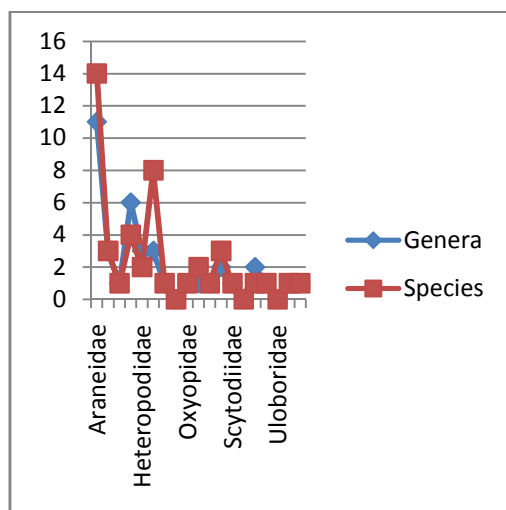


Figure-5
Genera and Species during May-Aug

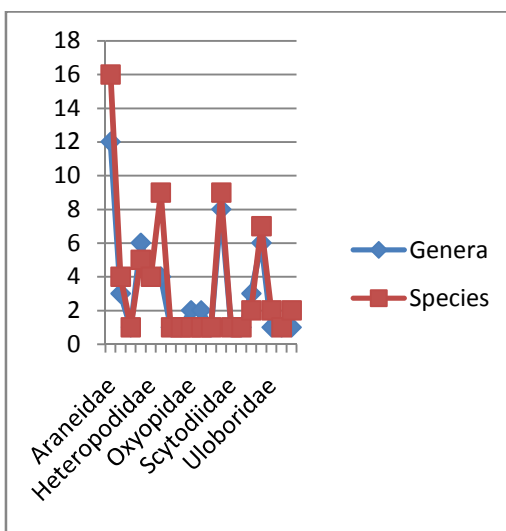


Figure-6
Genera and Species during Sept-Dec

Discussion: The purpose of study is to recognize families Genera and species which can sustain in the high temperature in the environment¹ is showing significant sustainability of families Araneidae and Lycosidae during the months of May to August except Araneidae and Lycosidae rest of seventeen families are showing significant down fall⁵. As earlier discussed the web of Araneidae and Lycosidae are also found undamaged and also observed web activities by these spiders⁸. During the sampling spiders of these two families is also show hyper activeness in the month of May.

Conclusion

The purpose of study is to recognize families Genera and species which can sustain in the high temperature in the environment (figure-1) is showing significant sustainability of families Araneidae and Lycosidae during the months of May to August except Araneidae and Lycosidae rest of seventeen families are showing significant down fall (figure-5). As earlier discussed the web of Araneidae and Lycosidae are also found undamaged and also observed web activities by these spiders⁹. During the sampling spiders of these two families is also show hyper activeness in the month of May

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