



## Taxonomic and ecologic studies of spiders from the citrus and guava fruit gardens of district Faisalabad, Pakistan

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### Abstract

Spiders were collected from citrus and guava gardens from four tehsils of Faisalabad viz., Samundri, Jaranwala, Tandlianwala and Faisalabad, Pakistan. Pitfall trapping method was used to collect spiders specimens from September 2010 to June 2011. A total 1054 specimens were collected representing six families. i.e Lycosidae 6 species, Thomisidae 3 species, Gnaphosidae 3 species, Saltisidae 7 species, Araneidae 3 species. Maximum recorded in September, October and November with peak in September because of gardens attacked by harmful insects. Different ecological niches and number of species showed dependent on its complexity.

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**Introduction**

In recent years, the application of insecticides in the agro-ecosystems of Pakistan has increased by several folds. Being non selective, non-targeted organisms such as the natural competitors, predators and parasites of pest insects get also killed. The resulting ecological imbalances and appearance of resistant pest strains have necessitated more damaging and repeated use of insecticides. Spiders being generalized predators arbitrarily feed on phytophagous as well as predacious insects and are most abundant insectivorous predators of terrestrial ecosystems (Wise, 1993). Approximately 120000 species known worldwide and only one forth has been named (Roberts, 1985). Due to their diversity and abundance, they notably reduce plant damage caused by insects in number of ways other than direct feeding on them (Riechert, 1999). In orchards whereas IPM is applied but broad spectrum pesticides are minimized, more complex and abundant spider communities can be developed to press the pests of the orchards (Bogyer, 1999). in Pakistan. many researchers such as Ghafoor and Beg, 2002; Ghafoor and Naz, 2003, Ghafoor and Mehmood 2011, Mohsin *et al* 2012, khuhro *et al* 2012 , Dzullehmi Muhammad Nasir 2014, P.V.P Mahavidyalaya *et al* 2015 have conducted researchon spiders systematics. The aim of the study was to reveal the different species from citrus and guava fruit gardens and show the differences among the spider fauna from under studied area and to assess the taxonomic and r ecological conditions.

**Materials and methods**

*Study area*

Spiders were collected from citrus and guava gardens sites of four tehsils viz., Samundri, Jaranwala, Tandlianwala and City Faisalabad of district Faisalabad, Pakistan.

*Methodology*

The method used to collect spiders was pitfall traps. It is used to collect ground dwelling spiders. It consists of cyllindrical glass jars ( roughly 7cm in diameter and 14cm in height) buried in the soil to ground level. Eachcontainer contains 150ml solution of alcohol and a small amount of Karosine oil tokill the spiders.

*Preservation*

Specimens were preserved in 95% ethyl alcohol plus few drops of glycerin and properly labeled their locality, date of collection etc. .

Identification:

Identification was done by using a syterio microscope (XTD-2A China) to study different organs of the spiders in the laboratory, Department of Zoology, University o f Sargodha, Women Campus, Faisalabad. Pakistan. The collected specimens were identified with the help of keys by Dyal (1935); Nentwig *et al.*2003, Tikader (1982) and Platnick (2004).

*Diversity parameter*

Their monthly fluctuations, diversity index, evenness and richness of different species were recorded.

**Results**

Spiders were collected from Guava and Citrus gardens from four tehsils of district Faisalabad. Pitfall trapping methods were used to collect specimens from September 2010-June 2011 based on morphological discrptions six families were determinend (Table 1).

**Table 1.** Spiders of different families caught in pitfall trap from citrus and guava gardens of given four tehsils of district Faisalabad during September 2010-june 2011.

Tehsils	September	October	November	December	January	February	March	April	May	June	Total
Jaranwala	23	12	10	15	4	6	10	16	11	8	115
Samundri	45	36	37	34	31	12	40	32	21	14	302
Tandlianwala	36	14	24	19	11	10	24	23	13	16	583
Faisalabad	85	56	64	40	35	17	53	34	26	24	534

Lycosidae family comprised of 5 genera and 14 species; the genus lycosa (Latreille, 1804) was represented by 5 species L. himalayensis, L. mackenziei, L. madani, L. tista and L. kemp. The genus Pardosa was representing by 4 species P. leucopalpis, P. sumatrana, P. birmanica, and P. oakleyi. The Hippasa was representing by 2 species H. partita and H. madhuae. The genus Eviippa represented by 2 species E. shivajji and E. banarensis. The genus Arctosa by only one species A. indicus. Thomisidae consisted of 2 genera and

3 species; The genus Thomisus was representing by T. bulani and T. pugilis while the genus Runcinia represented by one species R. roonwali. Gnaphosidae had 2 genera and 3 species; genus Gnaphosa represented by 2 species G. poonaensis and G. harpax and genus callilepis by C. lambai. Salticidae Contained 3 genera and 7 species; the genus Myrmarachne by two species M. marapha and M. orientales; genus Rhene by three species R. indica, R. decorate and R. danieli whereas genus plexippus by P. calcuttaensis and P. bengalienasis (Table 2).

**Table 2.** Total number of spiders from different families in each tehsil of district Faisalabad.

Family	Samundri	Faisalabad	Jaranwala	Tandlianwala	Total
Lycosidae	125	187	35	80	427
Araneidae	44	48	20	34	146
Salticidae	76	120	17	36	249
Thomisidae	26	33	14	18	91
Gnaphosidae	32	26	23	13	94
Clubionidae	12	20	6	9	47
Total	315	434	115	190	1054

Araneidae had 2 genera and 3 species; genus Cyclosa by 2 species viz., C. bifida and C. confragra while Nephila by only one species N. malabarensis whereas Clubionidae 1 genera and 1 species; genus Castianeira by 1 species C. himalayensis.

October and November with peak in September because of gardens attacked by pest insects. During the month of July diversity was moderate and mutually comparable while in June and November was least (Table 1). The family Thomisidae represented maximum diversity index while Lycosidae minimum. Similarly, Salticidae depicted maximum value of Evenness index whereas Lycosidae minimum. The highest Richness index was recorded for the family Salticidae while the lowest for Lycosidae (Table 3).

Maximum population fluctuation was recorded from September to October whereas least abundance in June, November and December. Maximum taxonomic diversity recorded in September,

**Table 3.** Diversity, evenness and richness indices of families during September 2010 to June 2011.

Family	Diversity	Evenness	Richness
Lycosidae	1.98	0.67	2.21
Aranidae	2.34	0.72	2.82
Salticidae	2.84	0.88	3.72
Thomisidae	2.92	0.87	3.61
Gnaphosidae	2.32	0.81	3.51
Clubionidae	2.12	0.72	2.98

**Discussion**

Spider species inhabiting the ground surface in any habitat have different ecological niches and number of species showed depend on its complexity.

Pitfall traps are biased towards the cursorial species (Bishop and Riechert, 1990). However, pitfall trapping have frequently been used for sampling the spiders fauna in managed system (Nentweg, 1988).

Araneidae is very large family comprised of 3935 genera and 44936 species all over the world (Platnick, 2014). Ghafoor and Beg (2002) described two araneid species from Faisalabad, Pakistan. Biswas and Biswas (2003) studied spider fauna of Sikkim, India. They deal with 91 species belonging 48 genera and 19 families. The species *Cyclosa bifida* described first time from cotton fields from Faisalabad in present studies and has already been discussed in literature (Dyal, 1935; Tikader, 1982; Biswas and Biswas, 2003) and described its taxonomical and ecological importance. Genus *Lycosa* comprised of many species which has been described by Tikader and Malhotra (1980) from different localities of India. During present study *Lycosa himalayensis* was recorded from Shahkot city district Nankana sahib. This species was collected first time from guava fields of Shahkot city. *Pardosa sumatrana* was recorded from guava gardens of Tandlianwala city. Tikader and Malhotra (1980) placed this genus under *Lycosa*.

*Hippasa holmerae* recorded first time from guava gardens of tehsil Tandlianwala, Faisalabad. Family Clubionidae comprised of 15 genera and 577 species (Platnick, 2014). Dyal (1935) studied three genera of this family from Lahore, Pakistan. Family Salticidae having genus rhene collected from guava gardens and citrus gardens from tehsil Faisalabad, district Faisalabad. Specimens belonged to this genus has already been discussed by (Tikader and Biswas, 1981; Biswas and biswas, 1992).

Family Gnaphosidae contributed few new species and genera from current studies. This family has also been discussed by Dyal (1935) from Lahore, and by Ghafoor and Beg (2002) from Punjab Pakistan. From present studies the Family Thomisidae consist of species *Thomisus bulani* recorded first time from Jaranwala and Sumandri. The collected material entirely agreed with the published description of this species (Tikader and Biswas, 1981). This family consisting of 2159 species comprised of 172 genera in the worldwide (Platnick, 2014). The genus thomisus have 142 known species (Platnick, 2004). Dyal (1935) recorded 3 species from Lahore, Pakistan.

*Thomisus bulani* was recorded first time from Jaranwala and Sumandri, Faisalabad. In Pakistan, this species was recorded from Lahore Dyal (1935) and by Ghafoor and Beg (2002). During present studies it was recorded from samundri district Faisalabad. Richness was maximum in September, October and November whereas minimum number of species was captured during December and January.

Maximum evenness was found in September and October while minimum in June and December. Maximum diversity was in August, September and October while minimum in June, July and December. To some extent from the current studies we have achieved the set goals. Spider fauna from citrus and guava fruit gardens were collected and data was recorded from the current studied areas. Population abundance was documented under the different ecological and environmental factors from fruit gardens of district Faisalabad, Pakistan.

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