



Spider diversity in Agroecosystem of Bori-Arab District-Yavatmal (Vidarbha)

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Abstract

Present investigation reflects the spider population and diversity in the agroecosystem of Bori-arab, Yavatmal district, Maharashtra India. The study was carried out for the 7 months from September 2016 to March 2017. Spiders were collected from cotton, banana and pomgranet cultivated area by using quadrants. Spider population in different seasons exhibited variation in species abundance and composition. In this study period we collected 108 spider species belonging to 3 families under the 8 genera and 13 species. Family Araneidae is dominant over Lycosidae and Salticidae. Species belonging to Araneidae family found in maximum number followed by Lycosidae and Salticidae.

Keywords: Agroecosystem, Yavatmal district, Araneidae, Lycosidae and Salticidae

INTRODUCTION

Spiders are generalist predators and one very potential biological agent in controlling insect pest in agricultural ecosystem. Diversity of spider species in natural ecosystem including agriculture was high. Spider diversity in temperate region has been well studied; tropical areas received relatively little investigation. Many studies show that the spider can vary significantly reduce pest population density such as leafhoppers (Cicadellidae), thrips (Thysanoptera), and aphids (Aphidae). 46,617 species of spiders have been identified in the world (World Spider Catalog Version 18.0. Platnic 2017). The first detail account of Indian spiders was provided by Pocock (1900) who listed 216 spider species. Several studies have shown that insect populations have significantly decrease when release from predation by spiders. Spider has great ecological importance because they occupy the top of the food chain of invertebrates and they display the greatest diversity and abundance. There are many environmental factors that affect species diversity (Rosenzweig 1995). Spiders are insectivorous animal and insect fauna changes with the change in vegetation. Several factors such as loss of habitat (Webb, 1990), the direct and indirect effect of pesticides and herbicides (Newton and Wyllie, 1992), increased use of drainage and fertilizers (Fuller, 1987), the loss and degradation of field boundary features (Barr et al., 1993), and changing patterns of cropping (Gibbons et al., 1993) cause reduction in diversity and abundance of spiders in agricultural fields.

Thus spiders functions as Biological control agents irrespective of their occurrence in house or in the fields. As these spiders are chiefly entomophagous (feeding on various insects and insect pests), they are of great importance to the agriculturists, entomologist and ecologist concerned with issues of natural and biological control. But still their role as biological control agents in agroecosystem is not well established. In the last

decade spate of new information regarding the behaviour of spiders in different agroecosystems have being available and this has increased the awareness about the spiders as beneficial organisms.

MATERIAL AND METHODS

a) Study Area:-

The present study areas are located in Yavatmal district, taluka Darwha, Maharashtra, India, at Bori-arab (village). Annual temperatures range from a high of 46 °C to low of 17°C Yavatmal becomes very hot during summer. The soil quality is very good of farm of Yavatmal district. Crop and food cultivation is very good. Experimental farm contains Cotton, Spinach, Banana and Pomegranate crop. Cotton is the major cultivated crop in Yavatmal district Vidharbha (India).

Study period:-

The study was carried out for a period of 7 months from September 2016 to March 2017. The sampling were made during early morning i.e. 6am to 9am at randomly from cottons, banana, spinach and pomegranate cultivated area.

Sampling:-

Sampling was done every month by quadrates method. In which the spiders were collected from 1 quadrate (25sq.m x 25sq.m) placed at four corners and one center of 25sq.m x 25sq.m area by visual search method between 6.00 am- 9.00 am.

Collected specimen of spiders from quadrate were bring in the arachnology laboratory Shri Shivaji College, Akola. For identification photography were made with the help of Steriozoom microscope dorsal, lateral and ventral view of the fresh specimen were taken for morphological identification and then preserved in 70% alcohol

and submitted to the Arachnology laboratory Shri Shivaji College, Akola .

Collections :

Spiders were collected from the different habitat of agro ecosystem of Yavatmal district. Collection of spider were done by using following methods:

1)Hand picking,2)Visual search 3)Inverted Umbrella

1) Direct Hand Picking:-Collection of most web building spiders was made by direct hand picking with the help of test tubes, or sample collecting tubes.

2) Visual Search:-Visually search spiders and captured or collected with the help of small stick, leaves, paper, jar, etc and transfer into the collecting tubes.

3) Inverted Umbrella:-In this method an inverted umbrella was placed below flowering shoots and bushes and when the tree or branch was thoroughly shaken, spiders along with insects fallen to the inverted umbrella. After removing leaves, spiders were transferred into collecting tubes.

Spreading of spider

Before the spiders were preserved for morphological study they were spreader with the help of warm water and the legs are stretch by using tiger pin. Them at the time of morphological study or photography (Topographic study) the body Parts

Table2.: Spider diversity in agro- ecosystem of Bori Arab, Yavatmal district During September 2016- March 2017

Habitas	Family	Genus/ Species
Banana field	1)Lycosidae	1) <i>Hippassa</i> spe. 2) <i>Pardosa amentata</i> 3) <i>Pardosa agrestis</i> 4) <i>Pardosa agricola</i> Female 5) <i>Pardosa agricola</i> Male 6) <i>Pardosa species</i> 7) <i>Pardosa spe.</i> Male
Cotton field	2) Araneidae	8) <i>Eriovixia spe.</i> Male . 9)Unidentified spe 1
	1)Araneidae	1) <i>Neoscona the isi</i> Female 2) <i>Neoscona the isi</i> Male 3) <i>Neoscona oaxacensis</i> 4) <i>Neoscona oaxacensis</i> Male 5) <i>Neoscona mukharji</i> Male 6) <i>Araneus inustus</i> 7) <i>Araneus inustus</i> Male 8) <i>Neoscona crucifera</i> 9) <i>Eriovixia spe.</i> 10) <i>Araneus angulatus</i> 11) <i>Eriovixia spe.</i> Male 12) <i>Neoscona spe.</i> Male 13)Unidentified spe2 14)Unidentified spe3
Pomegranate field	1)Araneidae	1) <i>Neoscona spe.</i> Male
Spinach field	1) Lycosidae	1) <i>Male wolf spider</i> 2) <i>Sassacus vitis</i> male 3) <i>sassaacus vitis</i>
	2) Salticidae	3) <i>sassaacus vitis</i>
	3) Araneidae	4)Unidentified spe4

like legs. Abdomen and palp were arranged in a live like manner with the help of forceps and brush and get continued a work.

They were properly kept in the collecting tubes and in these tubes a 70% alcohol is filled.

Alternatively tubes or vials are placed in a large bottle containing alcohol. This was the method used for preserving most specimens.

OBSERVATION AND RESULT

Present survey made on spider diversity of Banana, Cotton , Pomegranate and Spinach agricultural farm . The population dynamics study show that 108 individuals belonging to three families; from Araneidae (75), Lycosidae (26) and Salticidae (7). *Araneidae* represented maximum number of species followed by *Lycosidae* and *Salticidae*. This study shows that member of family Araneidae dominant over the remaining Lycosidae and Salticidae.

Table1.: Spider diversity in agro- ecosystem of Yavatmal district of family level

Family	No.of Genera	No.of species
Araneidae	3	7
Lycosidae	4	5
Salticidae	1	1

Table 3.: Species richness of spiders from different habitats of Bori-Arab Yavatmal district during September,2016 – March,2017.

Family	Genera / Species	No.of Ind.	% of Species
Araneidae	<i>Araneus angulatus spe.</i>	3	2.7%
	<i>Araneus inustus</i>	3	2.7%
	<i>Araneus inustus</i> Male	2	1.8%
	<i>Eriovixia spe.</i>	2	1.8%
	<i>Eriovixia spe.</i> Male	6	5.5%
	<i>Neoscona crucifera</i>	4	3.7%
	<i>Neoscona oaxacensis</i>	17	15.74%
	<i>Neoscona oaxacensis</i> Male	5	4.6%
	<i>Neoscona mukharji</i>	2	1.8%
	<i>Neoscona theisi</i> Female	8	7.4%
	<i>Neoscona theisi</i> Male	6	5.5%
	<i>Neoscona spe.</i> Male	6	5.5%
	Unidentified spe1	3	2.7%
	Unidentified spe2	2	1.8%
	Unidentified spe3	3	2.7%
	Unidentified spe4	3	2.7%
	<i>Hippassa spe.</i>	2	1.8%
	<i>Male wolf spider</i>	3	2.7%
Lycosidae	<i>Pardosa amentata</i>	4	3.7%
	<i>Pardosa agrestis</i>	4	3.7%
	<i>Pardosa agricola</i> Female	3	2.7%
	<i>Pardosa agricola</i> Male	4	3.7%
	<i>Pardosa spe.</i>	3	2.7%
	<i>Pardosa spe.</i> Male	3	2.7%
	<i>Sassacus vitis</i>	4	3.7%
	<i>Sassacus vitis</i>	3	2.7%
Total	108		
Salticidae			

Table 4: Species richness of spiders from different habitats of Bori –Arab Yavatmal district during September,2016 – March,2017

Family	No.of Ind.	Genera	No. of Species
Araneidae	75	3	7
Lycosidae	26	4	5
Salticidae	7	1	1

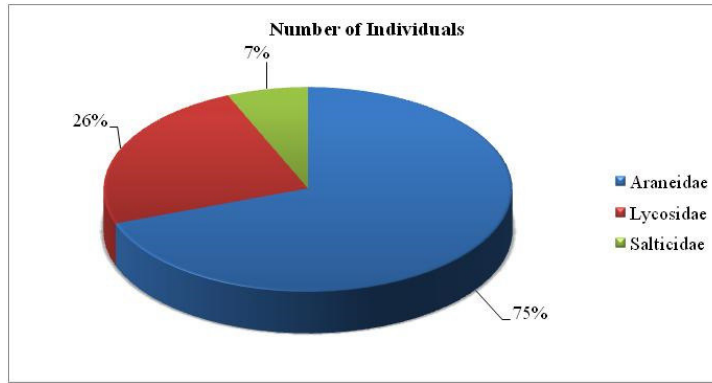















Fig. 1: Graphical representation of number of individuals in different family level in agro ecosystem of Bori-Arab Yavatmal District during September 2016 to March 2017.

In the present study member of three family identified; they are belonging to family Araneidae, Lycosidae, and Salticidae. Family Araneidae represent 4 genera and 5 species. While Lycosidae represent 3 genera and 5 species. Salticidae family represents 1 genera and 1 species.

PHOTOPLATES

Family-Araneidae		
		
<i>Araneus angulatus</i>	<i>Araneus inustus male</i>	<i>Eriovixia spe. Male</i>
		
<i>Neoscona crucifera</i>	<i>Neoscona oaxacensis</i>	<i>Neoscona oaxacensis male</i>
		
<i>Neoscona mukharji male</i>	<i>Neoscona theisi female</i>	<i>Neoscona thesi male</i>
Family-Lycosidae		

		
<p><i>Pardosa amentata</i></p>	<p><i>Pardosa agrestis</i></p>	<p><i>Pardosa agricola</i> female</p>
<p>Family-Salticidae</p>		
 <p><i>Sassacus vitis</i> (COCKERELL, 1894)</p>		

DISCUSSION

In the present study 13 species of spider belonging to 3 families from Yeotmal region collected and identified. These spiders were belonging to the family Lycosidae Salticidae and Araneidae. In this two types of spider categories were observed, one is web weavers and another one is non web weaves. The web weaving spiders were belonging to family Araneidae and Lycosidae. The non web weaving spiders were belonging to the family Salticidae.

The reasons for the fluctuation in different months may be due to seasonal variation and harvesting in the nearby fields to search the new niche. Spiders are considered as the favorable biological control agents in the agro eco system. The spiders are abundant throughout and all parts of country. They are an integrated part of all ecosystems and contribute to the balanced ecosystem evidently due to their predatory potential. They are found from hedges, shrubs, bushes and trees. The seasonal variation of spider population dynamics from this sites have been observed in the cotton field, maximum web – weaving individual had been found in cotton field November while less number of individual, were recorded during February.

SUMMARY

During the study period of September 2016 to March 2017 we collected 108 species of spider belonging to family Arameidae, Lycosidae and Salticidae. Maximum number of species belongs to the family Araneidae under the 3 genera and 7 species followed by family Lycosidae represents 4 genera and 5 species and family Salticidae represents one genera and one species.

Species *Neoscona theisi* is found in maximum number. *Neoscona theisi* from Araneidae family found in maximum number from the cotton field.

CONCLUSION

From the above study we concluded that spiders are important element of the nature, which helps to control pest population of agro-eco system. It is the biological control of pest population which is harmless to the field and also to the other organisms. Application of pesticides affected differently to the spider species. Maximum number of spider occur in cotton fields under the different families. The total collected samples of spiders comprises 108 individual consisting of 13 species, 8 genera and 3 families. We collected from Cotton, Pomegranate, Banana and Spinach filed.

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