

Diversity and Distribution of Spiders in Agro Ecosystem of Ernakulam, District, Kerala.

- 1 Ambily C B, Research Scholar, Cochin University of Science & Technology(CUSAT), cbambily@cusat.ac.in, Ph: 9995144630.
- 2 Anju Antony, Student, Mar Thoma College for Women, Perumbavoor.

ABSTRACT

The present study is based on the surveys conducted in agro-ecosystem during 2014-2015. Spiders are abundant and wide spread in almost all ecosystems and they are the best indicators of the overall species richness and health of terrestrial communities. The present study 40 species from 14 families are being reported. Aranidae were most commonly occurred family and followed by Salticidae. Diversity and population of spider was increased during the second cropping season *Mali*.

KEY WORDS:- Diversity, Spider, cropping seasons, Agro-ecosystem and pest management.

INTRODUCTION

The earth is inhabited by innumerable number of living organisms and not two individuals are alike. Spiders are the ancient animals with a history going back over 350 million years. Spiders are abundant and wide spread in almost all ecosystems and constitute one of the most important components of the global biodiversity (Sudhikumar, 2008^[3]). Spiders are clearly an integral part of global bio diversity since they play many important roles in ecosystems as predator and source of food for other creatures. Furthermore spiders

have already established themselves as model organisms in biochemical behavioural and ecological research (Sebastian & Peter, 2009^[2]). Spiders have a very significant role in ecology by being exclusively predatory and there by maintaining ecological equilibrium. Spiders are air breathing arthropods that have eight legs and chelicerae with fangs that inject venom. They are the largest order of arachnids and rank seventh in species diversity among all other groups of organisms.

MATERIALS AND METHODS

The area selected for this study was wetland paddy field at Mudakuzha of Ernakulam District. The study period consists of three cropping seasons *Njal, Mali and Punja*. *Njal* is the first cropping season. This season comprises 4 months June-September. Climatic condition in this season is rainy. Cultivation in this season was *Ponmany*. Second season is *Mali*. This season comprises the months October-January. The cultivated seed item was *Jothy*. Third cropping season is *Punja*. The climatic condition in this season is summer. Mainly *Pattamby* was cultivated during in this season. For the systematic recordings of the data entire field is divided into 4 sites, namely site I, II, III, IV. Quadrature method was used for the study. The work was carried out for one year from (2014 June-2015 May). Observation was carried out in the morning between 7-11 am. Observed species were identified and collected. Collection was conducted mainly by hand picking method. Gently knock the specimen by hand and transfer it into a transparent glass bottle. Collected specimens were preserved in 40% Alcohol. When specimen cannot pick by the hand, their morphology was observed and noted in the field book. Species were identified with the help of field guide (Sebastian & Peter 2009^[2]).

RESULTS & DISCUSSIONS

The study on spider diversity and population conducted at wetland paddy field of Mudakkuzha over a period of one year resulted in recording 1349 individuals of spider belonging to 40 species under 14 families. A check list of the spiders and family wise break up of taxes is given below.

Table:-I showing family wise check list of spider observed during study period.

NO.	FAMILY	SPECIES NAME
1	Araneidae	1. <i>Argiope aemula</i> 2. <i>Argiope anasuja</i> 3. <i>Argiope catenulata</i> 4. <i>Argiope pulchella</i> 5. <i>Cyrtophora citricola</i> 6. <i>Eriophora himalayaensis</i> 7. <i>Neoscona mukerjei</i> 8. <i>Zygiella indica</i>
2	Hahniidae	1. <i>Hahnia mridulae</i>
3	Lycosidae	1. <i>Lycosa tista</i> 2. <i>Paradosa sumatrana</i>
4	Nephilidae	1. <i>Nephila pilipes</i>
5	Oxyopidae	1. <i>Oxyopes birmanicus</i> 2. <i>Oxyopes javanus</i> 3. <i>Oxyopes shweta</i> 4. <i>Oxyopes sunandae</i>
6	Philodromidae	1. <i>Thanatus parangvulgaris</i> 2. <i>Tibellus elongates</i>
7	Pholcidae	1. <i>Crossopriza lyoni</i> 2. <i>Uthina atrigularis</i>
8	Psechridae	1. <i>Psechrus torvus</i>
9	Salticidae	1. <i>Asemonea tenuipes</i> 2. <i>Bavia Kairali</i> 3. <i>Epeus tener</i> 4. <i>Phintella vittata</i> 5. <i>Plexipus paykulli</i> 6. <i>Plexipus petersi</i>

10	Scytodidae	1. <i>Scytodes thoracica</i>
11	Sparassidae	1. <i>Heteropoda Venatoria</i> 2. <i>Olios Milleti</i>
12	Tetragnathidae	1. <i>Leucauge dorsotuberculata</i> 2. <i>Leucauge pondae</i> 3. <i>Tetragnatha mandibulata</i>
13	Theridiidae	1. <i>Achaearanea durage</i> 2. <i>Chrysso argyridiformosus</i> 3. <i>Theridion manjithar</i> 4. <i>Theridula angula</i>
14	Thomisidae	1. <i>Camaricus formosus</i> 2. <i>Oxytate Virens</i> 3. <i>Thomius projectus</i>

(Sebastian *et al* 2005^[1]; Sudhikumar and Sebastian 2003^[5] and Sebastian & Peter 2009^[2]).

Altogether 1349 individual belonging to 40 species coming under 14 families. The family Araneidae dominated with numerical strength of 8 species followed by Salticidae with 6 species. Presence of one species in families such as Hahinidae, Nephilidae, Scytodidae, Psechridae were listed as least abundant families. Sudhikumar *et al*, (2005^[4]) studied about seasonal variation of spider abundance in Kuttanadu rice agro system Kerala.

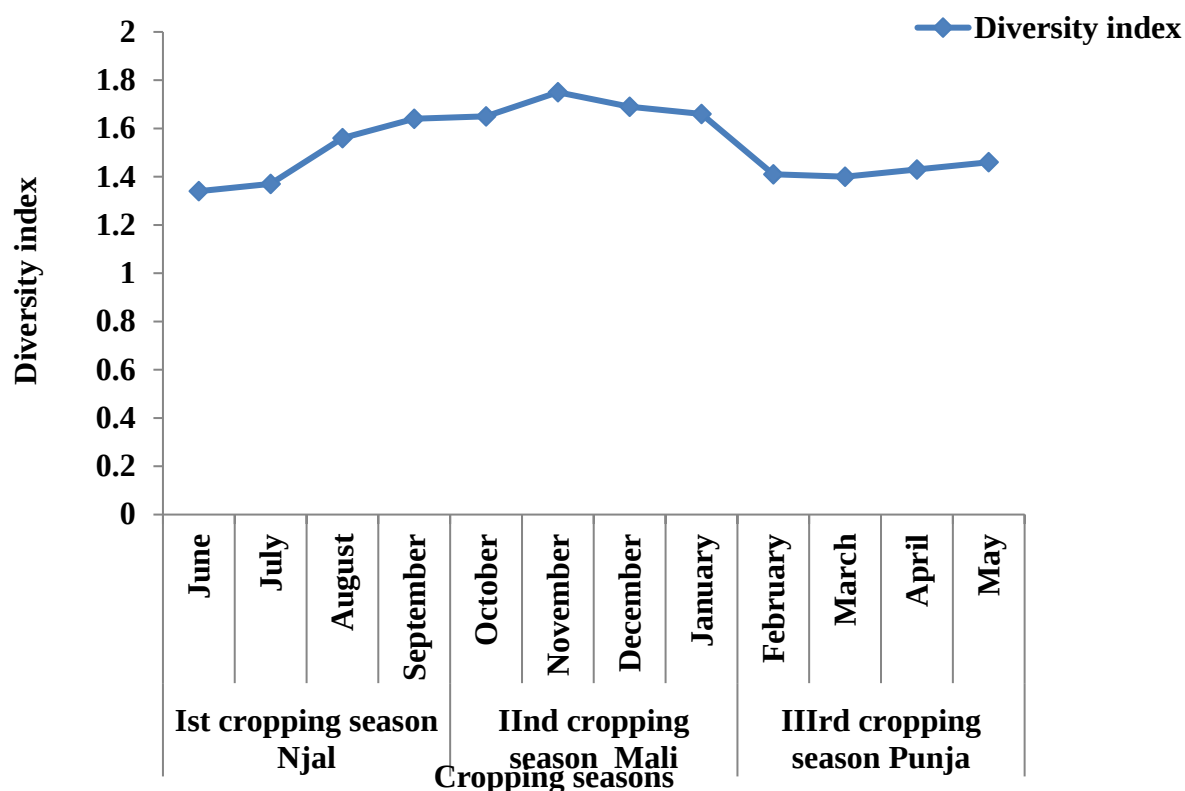


Fig.3 :- Diversity index of the spider species during three cropping seasons.

Maximum diversity index during the month of November and minimum in the month of June. Changes in the values of diversity index may be due to by the seasonal variation and changes in climatic condition.

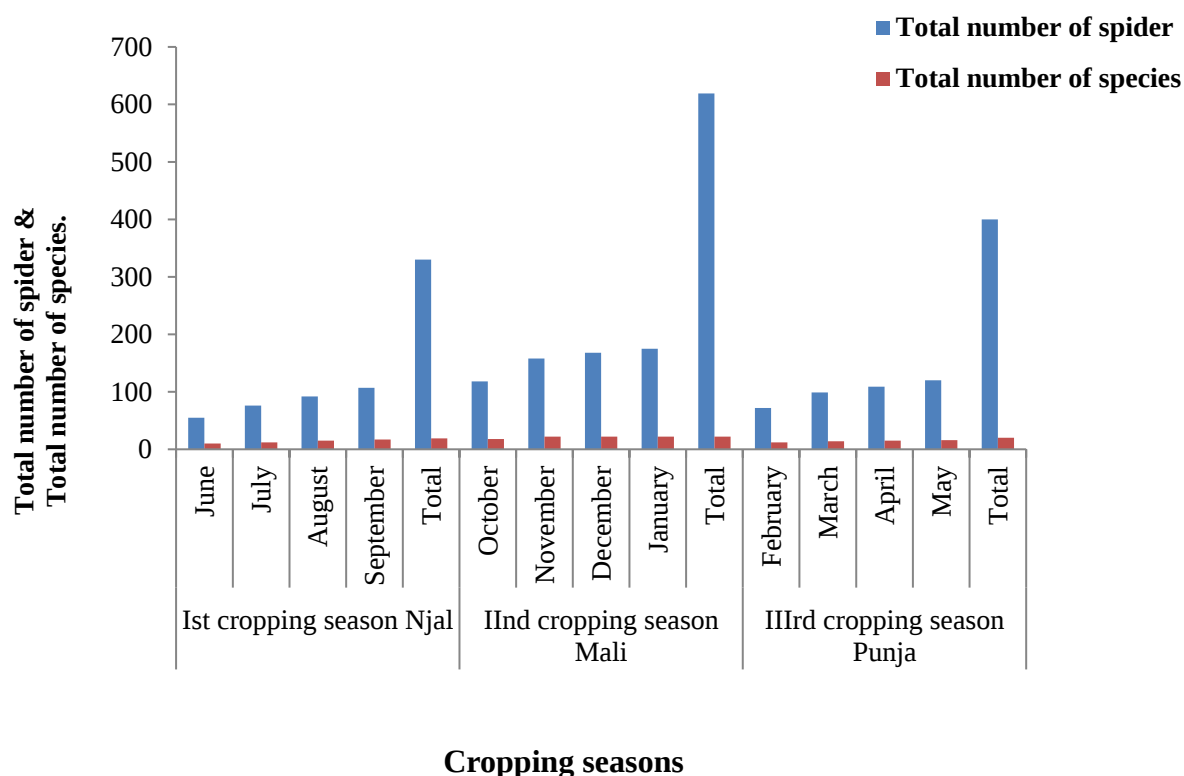


Fig. 2 :- Total number of spiders and total number of species observed during three cropping seasons.

In the first cropping season *Njal*, total number of spiders and total number of species high during September and low in June. Second cropping season *Mali* shows a characteristic increase in both number of individuals & species, which is high in January and low in October. In third cropping season *Punja*, the total number of individuals and species high in March and low in February. In all the three cropping season spiders are very rare during the initial stage of cultivation. But on the growing and at the harvesting stage of cultivation spider population become significantly increased.

Interaction of seasons on spider populations and its diversity was so significant. Increase in spider population and diversity are tied to the favorable climatic condition and feeding availability. First cropping season *Njal* characterize high rain fall. Increase in the intensity of

the rain decrease the spider population. Rain fall and wind made disturbances in its webs and habitats. The disturbance of habitat either by distruction or discomfort made the life of the spider in that habitat become more difficult. The rainy condition in the first cropping season prevalent the number of spider population. Humidity and average temperature in second season *Mali* provides a way for gradual increase in both population number and diversity of the species. The warm humid condition in the IInd cropping season also allows the flying insects (pests) to produce more generations. Increase in the insect population correlated with abundance of spider population. Increased insect populations provide suitable feeding availability for spiders. This made the spiders to become more active at this warm-humid condition. Spiders are generally preferred humidity and low temperature that limits them to area within the range of their physiological tolerance. Extreme temperature in the third season *Punja* also cause a reduction in both number of individuals and diversity of them. The rainy condition in the first cropping season prevalent the number of spider population. Humidity and average temperature in second season *Mali* provides a way for gradual increase in both population number and diversity of the species. The wet winter in the IInd cropping season followed by warm summer in the IIIrd cropping season allow the eight legged spiders to more abundant in this two cropping season than the rainy Ist cropping season.

Population fluctuation of spiders was greatly varied in three cropping seasons. The species *Bavia kairali* shows highest number of population and *Chrysso agrydiformosus* shows the least number of population. 330 individual's under 19 species were recorded in first cropping season. In which 8 of them *Camaricus formosus*, *Chrysso agrydiformis*, *Cyrtophora citricola*, *Hahina mridulae*, *Leucage dorsotuberculata*, *Phintella vittata*, *Thanatus parangvulgaris*, *Uthina atrigularis* were present this season only. They preference of less temperature and extreme cold condition for the thrive; allow their presence this season

only. *Camaricus formosus* shows high relative frequency and abundance. *Chrysso agrydiformosus* shows low relative frequency and abundance in first cropping season. 619 spiders from 22 species collected in second cropping season. *Bavia kairali* shows high relative frequency and abundance. *Paradosa sumatrana* shows low relative frequency and abundance. *Argiope anasuja*, *A.catenulata*, *A.pulchella*, *Crossopriza lyoni*, *Leucage pondae*, *Oxyopes birmanicus*, *Oxyopes sunandae*, *Scytodes thoracica* were shows their presents this season only, because they want humid condition for the existence. A total of 400 spiders from 20 species collected in third cropping season *Punja*. Out of the 20 species *Asemonea tenuipes* shows high relative frequency and abundance. *Argiope aemula* shows low relative frequency and abundance. *Achaearanea durage*, *Asemonea tenuipes*, *Neoscona muckerjei*, *Psechrus torvovus*, *Tibelleus elongates* were present this season only. Unavailability of extreme temperature in other season restricts their presence in first & second cropping season. *Bavia kairali* and *Plexippus paykulli* were present in all the three cropping season because they are more tolerates to the seasonal climatic changes. Relative frequency and abundance of spider species greatly varied in three cropping season. Relative frequency of species has a positive correlation with its abundance. When relative frequency increases abundance also increases.

Many threats to spider diversity have been documented. The primary threat is habitat loss and degradation due to deforestation, agriculture, grazing and urbanization. A large number of species become endangered due to urban development, land use management techniques air and ground water pollution caused by use of pesticides and fertilizers and trafficking for the pet trade. The major obstacle for spider conservation is an absence of public support, arguably due to fear and ignorance. Conservation of spider will thus necessitate a greater understanding by the general public scientists, land managers and

conservationists about the importance of conserving these fascinating creatures (Sebastian & Peter, 2009^[2]).

CONCLUSION

In this study it was understood that spiders are extremely abundant at natural habitats. In agro ecosystem they regulate the population of insect pests and other macro arthropods. They don't feed any part of the vegetation and do feed only the insects in it. Thus way they can able to control the pest attacks and thereby protects the crop from damages. Instead of chemical pesticides, these interesting model organisms can able to use as biological agents for insects control.

REFERENCES

- 1 Sebastian PA. Mathew MT, Joseph J & Biju.CR. The Spider Fauna Of The Irrigated Rice Ecosystem In Central Kerala India, Across Different Elevational Ranges, *The Journal Of Arachnology*, 2005; Pp 33: 247-255.
- 2 Sebastian PA & Peter KV. Spiders Of India, University Press Pvt. Ltd. Hyderabad, India 2009.
- 3 Sudhikumar AV. Taxonomy And Bionomics Of Some Predaceous Spiders In Insect Pests Of Rice Agro System In Kuttandu Kerala. Thesis Work Submitted To M.G. University, 2008. Pp 141-148.
- 4 Sudhikumar AV, Mathew MJ, Sunish Enathayil & Sebastian PA. Seasonal Variation In Spider Abundance In Kuttanadu Rice Agro System Kerala, *European Arachnology, Acta Zooligica Bulgarica Suppl No: 1*, 2005. Pp 181-190.
- 5 Sudhikumar AV. & Sebastian PA. Studies On Population Fluctuation Of Spiders In Kuttanadu Rice Agroecosystem, Proc 14th Kerala Science Congress, 2003. Pp 660-661.