

RESEARCH ARTICLE

Spider Density & Diversity in Agroecosystem of Akola district (Vidharbh) India

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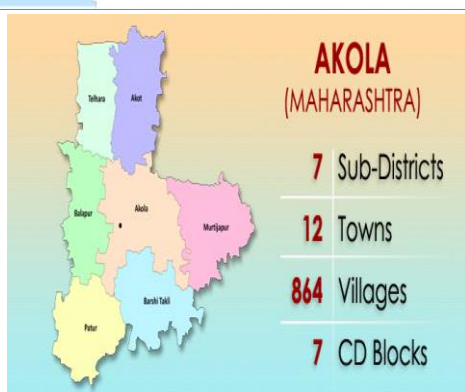
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| Manuscript details: | ABSTRACT |
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| <p>Available online on http://www.ijlsci.in</p> <p>ISSN: 2320-964X (Online) ISSN: 2320-7817 (Print)</p> <p>Editor: Dr. Arvind Chavhan</p> <p>Cite this article as: Asarkar GM and Ade PP (2017) Spider Density & Diversity in Agroecosystem of Akola district (Vidharbh), <i>Int. J. of Life Sciences</i>, Special Issue, A8: 103-108.</p> <p>Copyright: © Author, This is an open access article under the terms of the Creative Commons Attribution-Non-Commercial - No Derives License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.</p> | <p>Spiders are one of the predatory fauna found in agriculture fields which feeds on a wide range of insect pests and hence acts as buffer to limit pest populations. In our present study spiders were collected from cotton, banana, citrus field. Area of Akot region, dis Akola, Vidharbha. Akot is located at 20.7000° N 77.0142° E. The investigation was carried out for a period of six months from September 2016 to February 2017. Spider were collected from using hand picking, visual search method. During this study 14 species belonging to 12 genera and 7 families. Araneidae, Salticidae, Oxyopidae, Philodromidae, Scytodidae, Uloboridae, Lycosidae. Araneidae represented maximum number of species. The richness of the spider species based on the fluctuation in different months by the seasonal variation.</p> <p>Keywords: Spider density & diversity agroecosystem in Akola region Cotton, banana and Citrus.</p> |
| | <p>INTRODUCTION</p> <p>Cumulative studies made on spider from three major agricultural fields of Akola district Vidharbha. The agricultural ecosystem in Akola district is entirely dependent on rainy season as there is hardly any irrigation facility available in this area. Also, the agriculture fields are continuously been disturbed by farmers for getting fodder (weeds grown in between the main crops) to feed their cattle's. Spiders belonging to the order Araneae are generalist predators and one very potential biological agent in controlling insect pests in agricultural ecosystems (Marc 1999). Spiders are ubiquitous in terrestrial ecosystems and abundant in both natural and agricultural habitats (Turnbull 1973). They play an important role in regulating insect pests in agriculture ecosystems. Spider feed on insect and other Arthropods. They play important roles in pest's control. 46'617 species of spiders have been identified in the world (World Spider Catalog Version 18.0) Family of spiders that are often found in agro-ecosystems and play an important role in the natural control of insect pest species are members of the Araneidae, Linyphiidae, Lycosidae, Oxyopidae, Salticidae, Tetragnatidae, and Thomisidae (Susilo F. 2007). Spiders are considered to be of economic value to farmers as they play valuable role in pest</p> |

management by consuming large number of prey in the agriculture fields without any damage to crops (Rajeshwaram 2005), (Sundaeland 1999).

MATERIALS AND METHODS

The study area was located in district Akola region,, Maharashtra, India Akola is located at 20.7000° N 77.0142° E



MAP: AKOLA DISTRICT, VIDHARBHA

The investigation was carried out for a period of six months from September 2016 to February 2017. Sampling was conducted in 6 month at the randomly from selected cotton, banana and orange field.

Sampling was done every month from quadrates. Spider were collected from 1 quadrates (1sq.m x 1sq.m) placed at four corners and centre of 10 sq.m x 10 sq.m area by vivvsual search and hand picking method. Spiders were preserved after proper stretching into 70% alcohol. Morphological characters were noted down. Identification was done on basic of Omorphometric characters of various body parts and genitalia. The help was mainly taken from the keys and catalogues provided by Biswas&Biswas (2003,2004) Nentwig (2004) and Plantik (2004), world spider catlogue version 15 (2015)and various literature and information and photographs available on internet and other relevant literature

RESULTS AND DISCUSSION

Present study made on spider density in agroecosystem of Akola region . At random sampling were made from cotton, banana, and citrus cultivated area during this study we collected 14 spider species belonging to seven families (Table 1).

The population dynamic of spider collection yielded 14 species belonging to 12 genera and 7 families. Among the seven families, Araneidae 42%, Salticidae 14.28%,Oxyopidae 14.28%, Philodromidae 7.14%,Scytodidae 7.14%,Uloboridae 7.14%,Lycosidae 4.14%.Araneidae represented maximum number of species followed by Salticidae, Oxyopidae, Philodromidae, Scytodidae, Uloboridae, Lycosidae. (Table 1).

Generic density & diversity study show 4 genera belonging to family Araneidae, one genera to lycosidae, two genera represent by oxyppidae, one genera to philodromidae two genera belonging to salticidae and one genera to uloboridae (table 1).

Table 1: Taxonomical density & diversityof spider from different habitat of Akola district during September 2016-February 2017.

| Family | No. of Genera | No.of Species | % of Species |
|---------------|---------------|---------------|--------------|
| Araneidae | 04 | 06 | 42% |
| Lycosidae | 01 | 01 | 4.14% |
| Oxyopidae | 02 | 02 | 14.28% |
| Philodromidae | 01 | 01 | 7.14% |
| Salticidae | 02 | 02 | 14.28% |
| Scytodidae | 01 | 01 | 7.14% |
| Uloboridae | 01 | 01 | 7.14% |
| Total | 12 | 14 | |

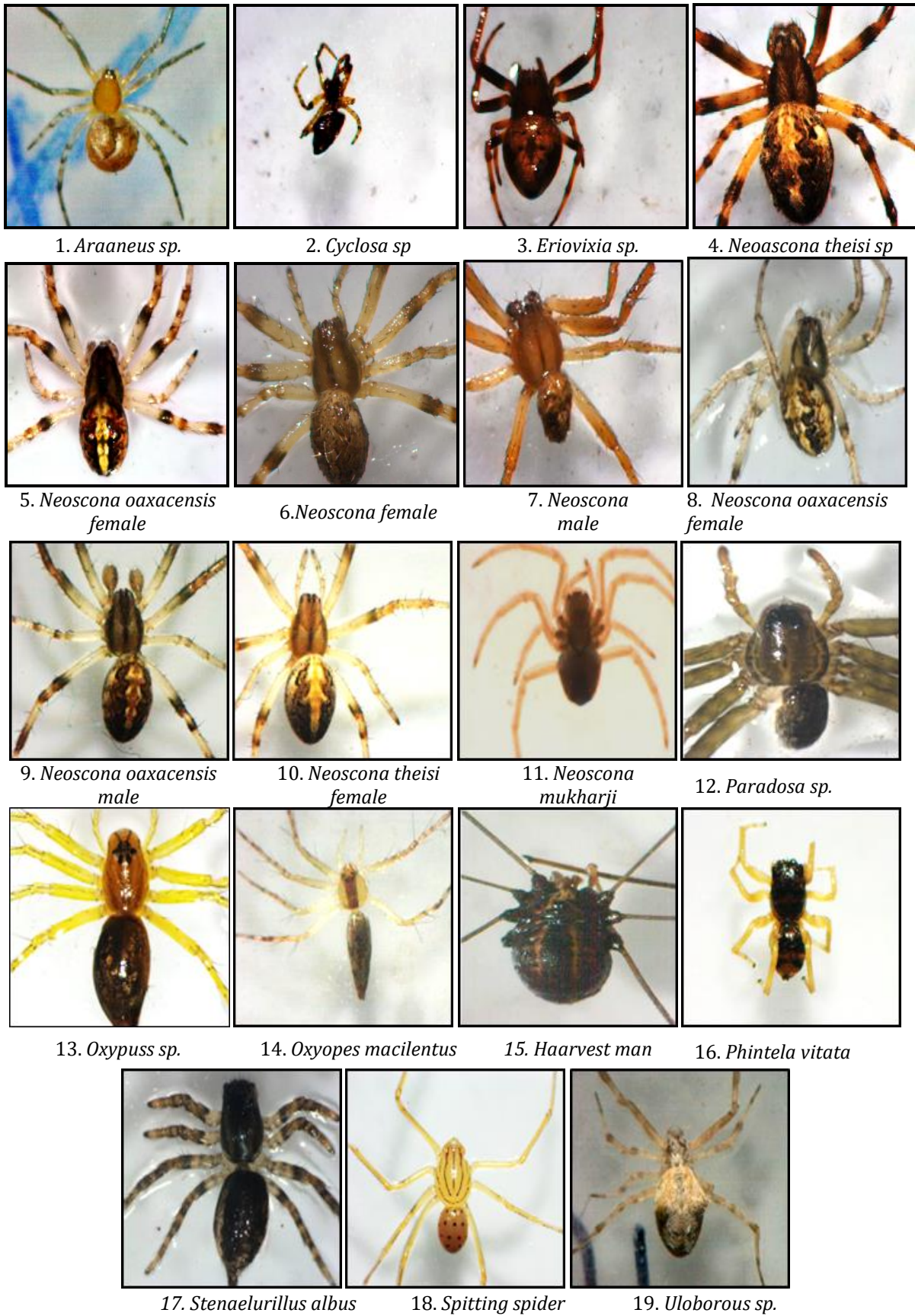


PHOTO PLATE 1 : Dorsal view 1- 11: ARANEIDEA; Fig. 12 LYCOSIDAE; Fig. 13-14 OXYOPIDAE; Fig. 15- PHILODROMIDAE; Fig. 16-17 SALTICIDAE; Fig. 18- SCYTODIDAE; Fig. 19 - ULOBORIDAE :

Table 2: Taxonomical density of spider from different habitat of Akola district, during September 2016-February 2017.

| Habitat | Family | Genus/species |
|--------------------------------|--------------------------|--------------------------------------|
| Banana | Araneidae | 1) <i>Araneus sp</i> |
| | | 2) <i>Cyclosa sp</i> |
| | | 3) <i>Eriovixia sp</i> |
| Cotton | Philodromidae | 1) <i>Haarvest man</i> |
| | Araneidae | 1) <i>Neoscona theise</i> female |
| | | 2) <i>Neoscona oaxacensis</i> female |
| | | 3) <i>Neoscona sp</i> female |
| | | 4) <i>Neoscona sp</i> male |
| | | 5) <i>Neoscona theise</i> |
| | | 6) <i>Neoscona mukharji</i> |
| | Lycosidae | 1) <i>Paradosa sp</i> |
| | Oxyopidae | 1) <i>Oxyopus sp</i> |
| | Salticidae | 1) <i>Phintella vitata</i> |
| 2) <i>Stenaelurillus albus</i> | | |
| Scytodidae | • <i>Spitting spider</i> | |
| Uloboridae | 1) <i>Uloborous sp</i> | |
| Orange | Araneidae | 1) <i>Araneus sp</i> |
| | Oxyopidae | 1) <i>Oxyopesmacilentus</i> |

Table 3: Species richness of spider from different habitat of Akola district September 2016-February 2017.

| Family | Species/Genera | No. of Ind. | % of species |
|------------|-----------------------------------|-------------|--------------|
| Araneidae | <i>Araneus sp</i> | 01 | 0.78% |
| | <i>Cyclosa sp</i> | 02 | 1.56% |
| | <i>Eriovixia sp</i> | 01 | 0.78% |
| | <i>Neoscona theisi</i> female | 25 | 19.53% |
| | <i>Neoscona oaxacensis</i> female | 29 | 22.65% |
| | <i>Neoscona sp</i> female | 18 | 14.06% |
| | <i>Neoscona sp</i> male | 06 | 4.68% |
| | <i>Neoscona mukharji</i> | 1 | 0.78% |
| Lycosidae | <i>Paradosa sp</i> | 2 | 1.55% |
| Oxyopidae | <i>Oxyopus sp</i> | 5 | 3.90% |
| | <i>Oxyopes macilentus</i> | 1 | 0.78% |
| Salticidae | <i>Phintella vitata</i> | 10 | 7.81% |
| | <i>Stenaelurillus albus</i> | 3 | 2.34% |
| Scytodidae | <i>Spitting spider</i> | 3 | 2.34% |
| Uloboridae | <i>Uloborous sp</i> | 20 | 15.62% |
| | Total | 128 | |

Species density & diversity study shows that maximum species belong to family Araneidae i.e. six species they are *Neoscona theisi* followed by *Neoscona oaxacensis*, *Neoscona mukharji*, *Araneus sp*, *Eriovixia sp* and *Cyclosa sp*. In the studied area Table 2. Whereas Oxyopidae and Salticidae represent two species each they are *Oxyopus sp*, *Oxyopes macilentus*, *Phintella vitata*

and *Stenaelurillus albus* respectively while remaining family represent one species each such as *Paradosa sp*, spitting spider and *Uloborous sp* respectively (Table 2). Similar results were also reported by Keshwani and Vankhede (2012) from the agroecosystem of Amravati district.

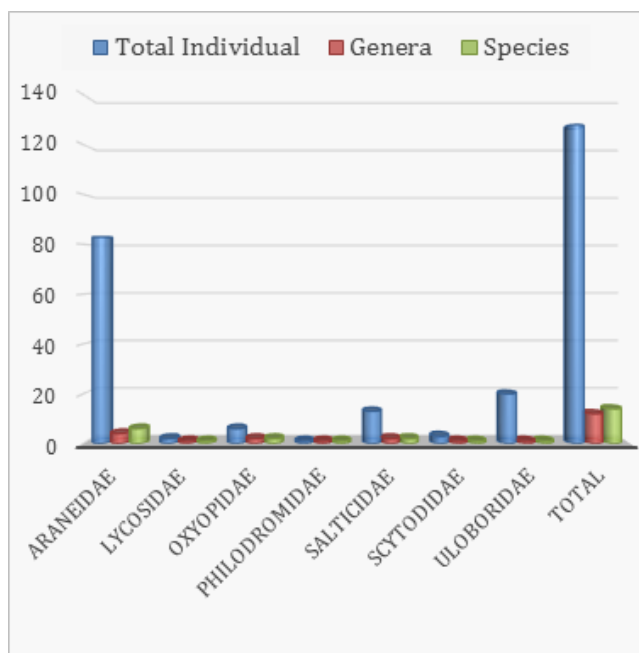


Fig. 1: Spider density & diversity of Agro-ecosystem in Akola District during September 2016 to February 2017.

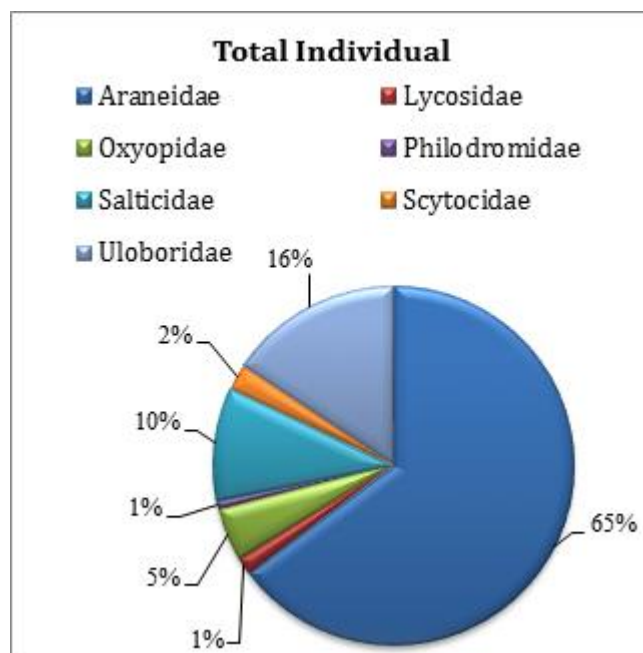


Fig. 2: Species richness of agro-ecosystem Akola District during September 2016 to February 2017

Comparative microhabitat study reveals that banana agro-ecosystem shows more spider diversity followed by Cotton, Banana and Orange agroecosystem.

In the present study we collected 128 individuals of the different species belonging to the six family (Table 3).

Species richness study reveals that *Neoscona oaxacensis* (22.65%); *Neoscona theisi* (19.53%) *Neoscona sp* (14.06%); *Cyclosa sp* (1.56%); *Neoscona sp male* (4.68%) and *Araneus sp*, *Eriovixia sp*, *Neoscona mukharji* (0.78%) in the collected sample (Table 3 and photoplate 1-6).

Graphical study shows that member of family Araneidae predominant throughout the period of investigation (Fig. 1)

DISCUSSION

In the present study, Fourteen species of spiders belonging to seven families in Akola district collected and identified. These spiders were belonging to the family Araneidae, Lycosidae, Oxyopidae, Philodromidae, Salticidae, Scytodidae, Uloboridae. In this study two species of spiders were observed, one is

web weaver and another one is non – web weaver. The web weaving spiders were belonging to the family Araneidae and Lycosidae. The non-web weaving spiders were belonging to the family Salticidae, Oxyopidae. 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. The study was resulted to identification of fourteen species belonging to twelve genera and eight families. The major families were, Araneidae, Oxyopidae and Salticidae, Scytodidae. Spiders are ubiquitous predators that are abundant and diverse in agricultural ecosystems. Spider assemblages have the ability to limit population growth of arthropod pests alone or in combination with other natural enemies (Mansour *et al.*, [1980], Oraze and Grigarick (1989), Riechert and Bishop [1990]; Carter and Rypstra (1995).

CONCLUSION AND SUGGESTION

Spiders are common and occur in high numbers in cotton fields, where they are also some of the very first predators to colonize the fields. In cotton fields they occur on the plants as well as the soil surface. Spiders

have a very wide range of prey, including all stages of a pest such as eggs, larvae, pupae and moths. They can show a reproductive response to increased numbers of a pest and prey preferentially on pests occurring in large numbers. Owing to the different guilds they occupy various families are affected differently by pesticides. Their presence in cotton fields should be encouraged and steps should be taken to protect them from harmful chemicals. Although spiders may be incapable of controlling major pest outbreaks by themselves, their role in a complex predatory community could be important in regulating pest species at low densities early in the season and between peaks of pest species activity. They may play an important role in keeping pests at endemic levels and prevent outbreaks from occurring in the first place. The total collected sample of spider comprised 128 individuals consisting of 14 species, 12 genera, and 7 families. We collected from Cotton, Banana, Orange habitat.

In present study during Sept. 2016 to Feb. 2017 the population dynamic of spider collection yielded 14 species belonging to 12 genera and seven family in regions. Comparative study of spider density & density in different habitat reveals that more spider were recorded from Banana, Cotton and Orange field among the seven family observed.

Highest species were found in Araneidae family six species followed by Uloboridae, Salticidae, Oxyopidae, Scytodidae, Philodromidae respectively.

Spider is important biological agent which help to control pest population in agroecosystem so there is need to use spider in agroecosystem for maintaining harmonious nature of environment

Conflicts of interest: The authors stated that no conflicts of interest.

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