

Date of Publication
01 March 2022

VidyawartaTM

International Multilingual Research Journal



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विद्यावार्ता: Interdisciplinary Multilingual Refereed Journal Impact Factor 8.14 (IJIF)

MAH/MUL/ 03051/2012

ISSN :2319 9318



**Special Issue
01 March 2022**

Editor

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विद्येविना मति गेली, मतीविना नीति गेली
नीतिविना गति गेली, गतिविना वित्त गेले
वित्तविना शूद्र स्वचले, इतके अनर्थ एका अविद्येने केले

-महात्मा ज्योतीराव फुले

❖ विद्यावार्ता या आंतरविद्याशाखीय बहुभाषिक त्रैमासिकात व्यक्त झालेल्या मतांशी मालक, प्रकाशक, मुद्रक, संपादक सहमत असतीलच असे नाही. न्यायक्षेत्र:बीड



"Printed by: Harshwardhan Publication Pvt.Ltd. Published by Ghodke Archana Rajendra & Printed & published at Harshwardhan Publication Pvt.Ltd.,At.Post. Limbaganesh Dist,Beed -431122 (Maharashtra) and Editor Dr. Gholap Bapu Ganpat.



Reg.No.U74120 MH2013 PTC 251205

Harshwardhan Publication Pvt.Ltd.

At.Post.Limbaganesh,Tq.Dist.Beed

Pin-431126 (Maharashtra) Cell:07588057695,09850203295

harshwardhanpubli@gmail.com, vidyawarta@gmail.com

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Significance of Spiders in Agricultural Sustainability

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Abstract

The number of pests developing resistance to pesticides has been increasing at a very alarming rate. A wide range of spider species inhabit agricultural fields. They are very good predators as well as voracious feeders. Spiders consume large numbers of insect pest as prey. Aside from chemical control, predation is the only way to limit herbivorous pests. Spiders are excellent at this task. Spider plays an important role as biological regulators of insect population in agro ecosystems. Spiders act as buffer to limit pest populations in crop. Thus, the spider community would be a key component of integrated pest management strategies.

Key words: Spiders, predator, agriculture
Introduction:

Spiders are present in all habitats. These are important invertebrate predators within numerous ecosystems. Till date, 49878 valid spider species from 4238 genera are known from the world (WSC, 2022). Herbivorous insects such as aphids, caterpillars and weevils destroy a large quantity of the world's total crop production each year. Spiders are the most abundant natural enemy that occurs in most agroecosystems. Soil, especially agricultural soil is home to many spider species. They consume large number of prey items in croplands each year and help to keep voracious pests in-check. But conventional farming practices like tilling, crop residue removal and monoculture can harm

or drastically reduce these beneficial bio-control agents. For the past several years, there has been increased interest in the utilization of natural enemies, particularly the predators for the management of insect pests of crops.

Spiders in various agroecosystems:

Research on spider diversity in agroecosystems is highly valuable to observe the effect they have on herbivorous pests (Maloney et al., 2003). Spiders of families Araneidae, Salticidae, Oxyopidae, Philodromidae, Scytodidae, Uloboridae, Lycosidae, Linyphiidae, Tetragnatidae, Thomisidae, Clubionidae, Eresidae, Gnaphosidae, Hersilidae, Miturgidae, Sparassidae and Theridiidae etc are recorded with various agricultural fields in India (Deshmukh and Chaudhari, 2016; Asarkar and Ade, 2017; Vairale, 2020). They are proved to be important predators of pests of cotton, rice, apple, banana, orchards and various other crops and plantations. Varied food preferences by different genera ensured superior natural control against crop pests. Their prey searching ability and polyphagy makes them effective predators of crop pests. (Anitha G and Vijay J, 2016). During the last 50 years, numerous studies on the spider faunas in agricultural habitats have been published all over the world. Some of these are reviewed in following table.

Table-1: List of some literature on the spider faunas in agroecosystems in various countries

Country	Agro ecosystem	Authors
Australia	soybean	Pearce et al. (2004)
Brazil	sugarcane	Barbosa et al. (1979)
Canada	wheat	Doane and Dondale (1979)
Egypt	soybean	Hendawy et al. (2009)
France	apple orchards	Dib et al. (2020)
Germany	cereals	Yann et al. (2005)
India	grapevine maize orange cotton, banana, citrus	Sadana and Sandhu (1977) Sharma and Sarup (1979) Deshmukh and Chaudhari (2016) Asarkar and Ade (2017)
Japan	rice	Yamano (1977)
Korea	rice	Okuma et al. (1978)
Mexico	coffee	Miguel et al. (2006)
Pakistan	soybean, sunflower, Indian mustard	Riaz et al. (2017)
South Africa	strawberry	Dippenaar-Schoeman (1979)
Tamil Nadu	maize	Saranya et al. (2019)
U.S.A.	soybean	Culin and Rust (1980)

Nutritional physiology of spider:

Spiders feed on a variety of available

prey such as mites, aphids, thrips and termites. Predation includes the egg and larval stages also. Due to the difference in feeding behaviour various stages of pests are preyed upon by different spider species. Smaller Prey like mites and thrips provide an important food especially to the young spiderlings. Spiders have extensible abdomen which enable them to consume large amount of food in relatively short periods. They are exceptionally well adapted to survive in nature. Spiders have high resistance to starvation because they can lower their metabolic rate due to which spider can survive during low prey density and harsh weather condition.

Environmentally Friendly Farming with spiders:

Lifespan of many spiders matches with agricultural rotation; this means they are meant for the crops. Number of spiders makes burrows in the soil and makes soil porous which helps in percolation of water in agricultural soil and increases water retention capacity of soil. Also, spiders feed on pests, nematodes and small arthropods. Spiders of family Saltisidae mostly feeds on small insects, Thomisids feed on flower insects. *Araneus mitificus* mostly feeds on red mites and bugs, thus, protects bark of the tree from damage (Deshmukh and Chaudhari, 2016). Their fecal matter makes better pH of soil and improves soil quality. In this way, spiders give free services to earth as soil builders. Spiders are considered to be of economic value to farmers as they play valuable role in pest management by consuming large number of prey in the agriculture fields without any damage to crops (Rajeshwaran et al., 2005). Spiders occurring in soils can be used as indicators of the sustainability and adequate management of agricultural landscapes (Jung et al., 2008). Farmer should be aware that once they stop using pesticides, the population of spiders in their field is also found to increase. Spiders can also be conserved in agroecosystems by providing hedges which can serve as a habitat when

there are no standing crops. To increase the number of spiders in ecosystem spider egg sacs can also be collected and covered with hay and placed around the standing crop. When young ones hatch, they go to the crop in search of pest. An agricultural program that is based on the use of predators like a spider would also create suitable environment for the return of several other beneficial insects which are unable to tolerate the presence of pesticides.

Conclusion:

Spiders are important predators of pests and harmful insects of cotton, rice, apple, banana and various other crops and plantation. In agricultural areas the use of spider would naturally lead to a decline in the use of poisonous chemical. By using spiders as biological agent to control insect pest population will hopefully help in enhancing the economic and eco friendly pest management in agriculture.

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