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SPIDERS AS BIOLOGICAL PEST CONTROL IN RICE FIELDS OF DAKSHINA KANNADA DISTRICT.

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ABSTRACT

Spiders with various foraging strategies to prey on insects and pests in rice fields can be considered as biological pest control in rice fields. They prey on several species which harm the growth of rice plants and, thus help to increase the yield of rice in two rice fields in Puttur taluk of Dakshina Kannada District. This resulted in confirmed identification 30 species of spiders belonging to 6 families Tetragnathida Oxyopidae dominate the field controlling pests in the field and act as biological control agents in agricultural ecosystem.

KEYWORDS: Tetragnathida Oxyopidae dominate.

INTRODUCTION

Spiders are dominant and most common predators in rice eco system. They are voracious feeders of leaf hoppers, plant hoppers, leaf eating caterpillars and adult stem borers. Research has shown that spiders in rice fields play an important role as predators (Chiu, 1979; Gavarra 1973; Hamamura, T, 1969; Holt, Cook, Perfect, 1987; Kobayashi. S, 1977; Lee and Kim, 2001; Samal Misra, 1975; Tanaka, 1989).

MATERIALS AND METHODS, PROCEDURE

A survey and systematic study of spider fauna was undertaken for a period of 6 months, every year (2013-2015) November in two different agro fields using following techniques: Hand picking: The spiders were caught with the help• of plastic vials simply by catching them into the vial and closing the opening end of vial. Sweeping methods: Using a heavy insect net sweeping• is done through the paddy plants gently. After a few sweeps, the content of the net is dumped onto a flat sheet and spiders are captured. This is one of the best methods for capturing active hunters like Salticidae, Oxyopidae, Lycosidae. Small species

like Tetragnathidae Freshly collected specimens are euthanized with ethyl• acetate, placed on the slide photographed. The data, location of collection, other morphological features are noted. They are stored in vials using 4% Formaldehyde or• 70% alcohol. The collected spiders were identified using the available• literature (Tikader, 1987) identification with Dr. Sebastian and others.

RESULTS

The study identified 30 species of spiders belonging to over 6 families. The major families were found in the two rice field study areas were Araneidae, Salticidae, Tetragnathidae, and Oxyopidae. The web weaving category the highest values of species were obtained for the spider collection in Puttur fields. The web building spiders expend considerable amounts of energy and time building their webs rather in moving about in search of prey.

List of spider species found in the two rice fields selected for observation during June to November period over 3 years (2013-2015)-

Sl .No	Family	Species	No of individuals	Status
1	Araneidae	Gasteracantha geminata Fabricius, 1798.	12	C
		Neoscona theisi Walckenaer,	15	C
		1841.Argiope anasuja Thorell, 1887.	18	C
		Neoscona mukerjei Tikader, 1980.	25	Vc
		Neoscona nautica L. Koch, 1875. Argiope	22	Vc
		pulchella Thorell, 1887	12	C
2	Salticidae	Bavia kairali Simon, 1877.	9	V
		Menemerus bivittatus Dufour, 1831.	2	C
		Plexippus paykulli Audouin, 1826.	8	R
		Plexippus petersi Karsch, 1878.	22	VC
		Telamonia dimidiata Simon 1899.		C
		Thiania bhamoensis Thorell, 1887.	13	Vr
		Hasarius adansoni	4	R

		Audouin, 1826	9	
3	Tetragnathidae	Tetragnatha viridorufa Gravely, 1921.	20	C
		Tylorida ventralis Thorell, 1877.	19	C
		Tetragnatha cochinensis Gravely,1921.	14	C
		Tetragnatha javana Thorell, 1890.	20	Vc
		Leucauge decorata Walckenaer, 1841.	19	Vc
		Leucauge pondae Tikader 1970	22	C
		Tetragnatha mandibulata Walckenaer, 1842	24	c
4	Oxyopidae	Oxyopes salticus Hentz, 1845 .Peucetia viridana Stoliczka, 1869. Oxyopes bimanicus Thorell 1887.	5	R
			9	R
			19	C
		Oxyopes shweta Tikader, 1970.	18	C
		Oxyopes sunandae Tikader, 1970	12	C
5	Thomisidae	Oxytate virens Thorell, 1891	9	r

The following spiders were found to be very common in the study – Neoscona mukerjei Tikader, 1980, Neoscona nautica L. Koch, 1875, Bavia kairali Simon, 1877. Plexippus paykulli Audouin, 1826, Plexippus petersi Karsch, 1878, Hyllus semicupreus Simon, 1885, Leucauge decorata Walckenaer, 1841, Leucauge pondae Tikader, 1970, Perenethis venusta L. Koch, 1878. Yellow stem borer (Scirpophaga incertulas Walker, 1863) and leaf rollers (Cnaphalocrocis medinalis Guenée, 1854) Rice Earhead Bug (Leptocorisa oratorius Fabricius, 1794) are major pests causing damage to rice field in this part of Dakshina kannada district (Moorthy and Moorthy, 1997). Highest season of pests like Yellow stem borer (Scirpophaga incertulas Walker, 1863) were found to be in October- November (Bandong and Litsinger, 2005) the following moths were also observed in the field. Brown planthopper

(Nilaparvata lugens Stål, 1854) was found and the caterpillars have found to eat leaf blades of paddy plants (Basanth, Sannaveerappanavar, and Gowda, D S, 2013). Leaf rollers (Cnaphalocrocis medinalis Guenée, 1854) (Padmavathi et al., 2013), Rice Earhead Bug (Leptocorisa oratorius Fabricius, 1794) were also found. Rice Caseworm (Nymphula depunctalis Guenee, 1854) were also found to exist in the fields.

DISCUSSION

While observing the spiders existing in the two study fields of Puttur, Families of Salticidae, Araneidae, Tetragnathidae and Oxyopidae found to be dominate over others. The structure of vegetation and some physiochemical• habitat parameters may determine a spiders habitat choice. (Mrzljak and Wiegleb, 2000) Spider diversity in the age of 50-60 days rice plants was• found to be higher than other days. Spiders play and important role in regulating insect• pests in agricultural ecosystem. (Sebastian, Mathew, Beevi, Joseph and Biju, 2005) Salticidae are true jumpers. Many workers reported that• Salticidae are diurnal unlike other major group of wandering spiders and they hunt by sitting on leaves and stems. (Givens, 1978) Araneidae was the family dominating in this study area.• Since they are true orb-web weavers and they are also very good predators. They bite and eat the insect which stick and the orb webs. They are dominant may be due to the availability of sized orb-web Argiope species, showed more affinity towards Leptocorisa oratorius Fabricius, 1794 than nest of spiders. Several studies have suggested that spider dispersed and recolonization of fields are significant aspects of spider population dynamics in agro ecosystem.(Bishop and Riechert, 1990) Tetragnatha species effectively reduce population of• green leaf hoppers and brown plant hoppers. All spiders showed correlation with rice pests. Spider• population need to be highest with the increase in number of pests too, during the months July, August and September.

CONCLUSION

The study showed a good positive number of existence of spiders in the paddy field and could survive eating the insects which enters the paddy fields including many pests which otherwise would have harmed the quality and quantity of yield of rice in the studied rice fields of Puttur Taluk in Dakshina Kannada District.

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REFERENCES

1. Basanth, Y. S., Sannaveerappanavar, V. T. and Gowda, D S. 2013.
2. Susceptibility of different populations of Nilaparvata lugens from major rice growing areas of Karnataka, India to different groups of insecticides. Rice Science, 20(5): 371–378.
3. Bishop, L. and Riechert, S. E. 1990. Spider colonization of agroecosystems: mode and source. Environmental Entomology, 19(6): 1738–1745.
4. Chiu, S.-C. 1979. Biological control of the brown planthopper. Brown Planthopper: Threat to Rice Production in Asia, 335–355.
5. Gavarra, M. and Raros, R. S. 1973. Studies on the biology of the predator wolf spider, Lycosa pseudoannulata Bös. st Str.(Araneae: Lycosidae. Philippine Entomologist, 2(6): 427.
6. Givens, R. P. 1978. Dimorphic foraging strategies of a salticid spider (Phidippus audax. Ecology, 59(2): 309–321. Hamamura, T. 1969.
7. Seasonal fluctuation of spider population in paddy fields. Acta Arachnologica, 22(2): 40–50. Holt, J., Cook, A. G., Perfect, T. J. and Norton, G. A. 1987.
8. Simulation analysis of brown planthopper (Nilaparvata lugens) population dynamics on rice in the Philippines. Journal of Applied Ecology, 87–102. Kobayashi. S. 1977.
9. Change in population density of spiders in paddy field during winter. Acta Arachnologica, 27(Specialnumber), 247–251. Lee, J.-H. and Kim, S.-T. 2001.
10. Use of spiders as natural enemies to control rice pests in Korea. Food and Fertilizer Technology Center. Moorthy, V. K. and Moorthy, A. K. 1997. Rice Cultivation for Food Security at Varanashi Farms, Adyanadka. Mrzljak, J. and Wiegleb, G. 2000.
11. Spider colonization of former brown coal mining areas time or structure dependent? Landscape and Urban Planning, 51(2): 131– 146.
12. Padmavathi, C., Katti, G., Sailaja, V., Padmakumari, A. P., Jhansilakshmi, V., Prabhakar, M. and Prasad, Y. G. 2013.
13. Temperature thresholds and thermal requirements for the development of the rice leaf folder, Cnaphalocrocis medinalis. Journal of Insect Science, 13(1): 96.

14. Samal, P. and Misra, B. C. 1975. Spiders: The most effective natural enemies of the brown planthoppers in rice. Rice Entomol. Newsl, 3, 31. Sebastian, P. A., Mathew, M. J., Beevi, S. P., Joseph, J. and Biju, C. R. 2005.
15. The spider fauna of the irrigated rice ecosystem in central Kerala, India across different elevational ranges. Journal of Arachnology, 33(2): 247– 255.
16. Tanaka, K. 1989. Movement of the spiders in arable land. Plant Protection, 43(1): 34–39.
17. Tikader, B. K. 1987. Handbook, Indian Spiders. The Survey.