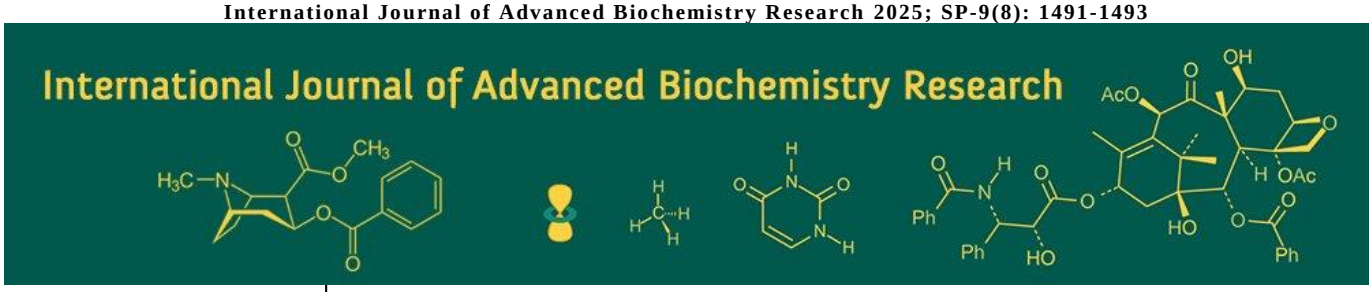

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Biodiversity of major predators associated with stem borers in rice ecosystem of Kerala, India

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Abstract
Rice is the staple food crop and is grown extensively in India. Insect-pests take a heavy toll of rice crop, rice belt of Kerala resulting in losses in grain yields. Insect specific predators and parasites used in biological control acts as natural biological control agents for these insect pests in the region. Keeping in view the above facts, surveys was conducted in *Kharif* season of 2018 to study natural enemy diversity (Predators) prevalent in rice in wetland rice ecosystem of South Kerala at three locations (Thiruvananthapuram, Onattukara and Kuttanad). The results revealed that predators like dragon fly's damsel flies, coccinellids and spiders were found to be the major natural enemies in wetland rice ecosystem of South Kerala. Among the three locations, the highest population of major predators, dragon flies, damsel flies, coccinellids and spiders were recorded in Kuttanad and the lowest recorded in Onattukara.

Keywords: Rice, Predators, Survey, Natural Enemies, Yellow stem borer

Introduction
Rice, *Oryza sativa* L., occupies more than one third of the world's total area in Asia. Rice is India's most important staple food crop, providing food security and livelihood security to more than half of the population (FAO, 2004) [1] (Mondal and Chakraborty, 2016) [6]. Rice is the primary food source for around 2.5 billion people in Asia. Rice is grown on 160.75 million hectares around the world, with a production of 488.23 million tonnes (USDA, 2018) [14]. With a total area of 433.88 lakh ha and a yield of 104.32 million t, India is the world's second-largest rice producer after China.

In Kerala, rice is cultivated in an area of 1.71 lakh ha with a production of 4.36 LT (GOI, 2017) [3]. The pest difficulties linked with rice are one of the main causes for the crop's low productivity. In India, around 300 insect species have been reported to damage rice crops, with 20 identified as serious pests (Arora and Dhaliwal, 1996). The rice crop in Kerala is home to a variety of insect pests, some of which cause serious economic harm, ranging from 20% yield losses to complete crop failure during epidemics. The region's major pests include the yellow stem borer, leaf folder, case worm, hispa, rice bug, swarming caterpillar, thrips, gall midge, and army worm (Shylesha *et al*., 2006) [13]. In recent years, numerous pests that were once considered small pests have advanced to the level of big pests, and major outbreaks of some pests in specific areas have resulted in significant crop losses (Garg *et al*, 2004) [2].

The rice fields of Kerala, on the other hand, have a diverse group of natural enemies (predators). Farmers' plays, these natural biological control agents are in charge of managing the population growth of rice insect pests. When favourable conditions for their survival, development, conservation, and reproduction prevail, these natural enemies play a dominant role in lowering pest populations in the crop ecosystem. Furthermore, it is critical to correctly identify natural enemies and understand their roles in order to maximise insect pest management tactics (Way and Heong, 1994) [15]. In light of the importance of the above facts, a field survey was conducted in the *Kharif* season of 2018 to identify and study the major predators as well as their population intensity, in relation to stem borer population and damage in three locations in South Kerala:

Thiruvananthapuram, Onattukara, and Kuttanad.

Materials and Methods

A field survey was conducted during *Kharif* season of 2018 in the major paddy growing areas of South Kerala *viz*., Thiruvananthapuram, Onattukara and Kuttanad. Five plots were selected from each location having an area not less than one acre to study population dynamics of stem borers and and their associated natural enemies. The observations were taken at bi-weekly intervals from seedling (15 DAS) to harvest stage (90 DAS). Standard sampling procedures were followed to record the incidence of pests and their natural enemies. In a one acre of rice field, five plots, each of 25 square metre area were demarcated. In each selected plots, 10 random sweeps were taken using an insect sweep net to collect predators. Collected specimens were taxonomically identified counted and preserved in 70% alcohol.

Results and Discussion

The population density of predators was recorded at different intervals after sowing rice in Thiruvananthapuram, Onattukara and Kuttanad. The survey revealed that dragon flies, damsel flies, coccinellids and spiders were the major predators see plate 1. The population level was observed throughout the period of observation at 15, 30, 45, 60, 75 and 90 DAS.

Mean Population of Predators

Data on the population of predator's *viz*., dragonflies, damselflies, coccinellids and spiders were recorded during 15, 30, 45, 60, 75 and 90 DAS and presented below. The data on the mean population of major predators *viz*., dragonflies, damselflies, coccinellids and spiders 10 sweeps-1 were recorded in the paddy fields of the three locations; Thiruvananthapuram, Onattukara and Kuttanad at bi-weekly intervals and given in Table 1.

The highest population of dragonflies was recorded in Kuttanad with 0.40 and 1.36 at 15 and 30 DAS respectively. Similarly, the lowest population of 0.24 and 1.16 were recorded at 15 and 30 DAS respectively in Thiruvananthapuram. But at 45 and 60 DAS, the highest population was recorded in Kuttanad with 1.92 and 2.32, the lowest recorded in Onattukara with a mean population of 1.36 and 1.76 respectively. The highest mean population of 2.0 was recorded in Kuttanad at 75 DAS. At 90 DAS the highest population of 1.96 was recorded in Thiruvananthapuram and the lowest recorded in Onattukara (1.64) with studied by (Premila, K. S. and Nalinakumari, T. 2002-3) given by (Kraker *et al*., 1999) [4].

The data on the mean population of damselflies 10 sweeps-1 was recorded in the three locations at biweekly intervals. The lowest damselfly population 0.64 in Kuttanad was 0.64, 1.6 and 2.48 at 15, 30 and 45 DAS respectively. The next highest population of 1.32, 1.92 and 1.94 were recorded in Thiruvananthapuram at 30, 45 and 60 DAS respectively. At 75 and 90 DAS the highest population of 1.76 and 2.24 were recorded in Thiruvananthapuram. Reported by (Sharma *et al*., 2019) [11].

In the three locations *viz*., Thiruvananthapuram, Onattukara and Kuttanad, the data on mean population of coccinellids 10 sweeps-1 were also recorded. The coccinellids recorded were the highest in Kuttanad throughout the period of observation with a mean population of 1.64, 1.08, 1.44, 1.76, 1.72 and 1.92 respectively at 15, 30, 45, 60, 75 and 90 DAS. The data on mean population of spiders 10 sweeps-1 at bi-weekly intervals were observed. The population of spiders recorded were also the highest in Kuttanad throughout the period of observation with a mean population of 0.6, 1.16, 1.46, 1.6, 1.56 and 2.24 at 15, 30, 45, 60, 75 and 90 DAS, respectively. Reported by (Yadav *et al*., 2018) [17].

Plate 1: Predators in rice ecosystem

Table 1: Population of predators in rice fields of Thiruvananthapuram, Onattukara and Kuttanad.

Period of observation	Dragon flies	Thiruvananthapuram			Mean population of predators10 sweeps^{-1}							
					Onattukara					Kuttanad		Spider
		Damsel flies	Coccinellids	Spider	Dragon flies	Damsel flies	Coccinellids	Spider	Dragon flies	Damsel flies	Coccinellids	
15 DAS	0.24	0.48	0.60	0.36	0.28	0.48	0.48	0.4	0.4	0.64	0.64	0.6
30 DAS	1.16	1.32	0.84	0.96	1.24	1.24	0.68	0.88	1.36	1.6	1.08	1.16
45 DAS	1.72	1.92	1.16	1.08	1.36	1.76	1.04	1.30	1.92	2.48	1.44	1.46
60 DAS	2.04	1.94	1.24	1.52	1.76	1.62	1.6	1.32	2.32	2.56	1.76	1.6
75 DAS	1.52	1.76	0.68	0.92	1.56	1.56	1.32	1.08	2	1.64	1.72	1.56
90DAS	1.96	2.24	1.52	1.56	1.64	1.56	1.76	1.56	1.84	1.64	1.92	2.24

Conclusion

From the results it can be concluded that the survey was conducted during *Kharif* season of 2018 in the major paddy growing areas of south Kerala *viz*., Thiruvananthapuram, Onattukara and Kuttanad. To study population dynamics of natural enemies *viz*, Predators (Dragon flies, Damsel flies, Coccinellids and Spiders). Among the three locations, the highest mean population of damsel flies was observed in Kuttanad and lowest in Thiruvananthapuram and Onattukara.

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References

1. FAO. The state of food security in the world. Rome, Italy: Food and Agriculture Organization; 2004. p. 30-31.
2. Garg DK, Jeswani MD, Mahesh P. IPM in rice eco-system. In: Prasad D, Singh A, editors. Advances in plant protection sciences. New Delhi: Society of Plant Prot. Sci, Division of Nematology, IARI; 2004. p. 404-419.
3. Government of India, Ministry of Agriculture and Farmers' Welfare (GOI). Annual report 2016-17. New Delhi: Krishibhavan; 2017. 194 p.
4. Kraker JD, van Huis A, Heong KL, van Lenteren JC, Rabbinge R. Population dynamics of rice leaffolders (Lepidoptera: Pyralidae) and their natural enemies in irrigated rice in the Philippines. Bull Entomol Res. 1999;89:411-421.
5. Lekha M. Management of the leaf roller complex on rice, *Oryza sativa* L.. Thrissur: Kerala Agricultural University; 2003. 116 p.
6. Mondal IH, Chakraborty K. Relative efficiency of some selected insecticide formulations on yellow stem borer, *Scirpophaga incertulas* (Walk.) in rice field at Murshidabad, West Bengal, India. J Entomol Zool Stud. 2016;4(6):471-477.
7. Premila KS. Major predators in rice ecosystem and their potential in rice pest management. Thrissur: Kerala Agricultural University; 2003. 237 p.
8. Premila KS, Nalinakumari T. Occurrence and distribution of pests and natural enemies in three rice ecosystems of Kerala. In: National Symposium on Priorities and Strategies for Rice Research in High Rainfall Tropics; 2002 Oct 10; Regional Agricultural Research Station, Pattambi, Kerala. Kerala Agricultural University; p. 62-63.
9. Ranjith AP, Veena T, Rajesh KM, Nasser M. Diversity, abundance and host-parasitoid association of Microgastrine (Hymenoptera: Braconidae) wasps in rice fields of Kerala. In: National Workshop on the Identification of Bees, Wasps, Beetles and Bugs; 2015 Apr 27-28.
10. Reghunathan P, Nandakumar C, Remamony KS. Natural enemies of rice insect pests in the Vellayani lake ecosystem. Proc Kerala Sci Cong. 1990; p. 47-48.
11. Sharma S, Shera PS, Kamaldeep S, Sangha S. Species composition of parasitoids and predators in two rice agro-farming systems—effect of ecological intensification. Int J Trop Insect Sci. 2019;40(2).
12. Shobha YB. Eco-friendly management of major pests of upland rice ecosystem [MSc thesis]. Thrissur: Kerala Agricultural University; 2018. 94 p.
13. Shylesha AN, Azad Thakur NS, Pathak KA, Rao KR, Saikia K, Surose S, *et al*. Integrated management of insect pests of crops in North Eastern Hill Region. Technical Bulletin. 2006;19:50 p.
14. USDA. World: Rice area, yield and production. United States Department of Agriculture 2018: http://apps.fas.usda.gov/psdoline/reportHandler.ashx
15. Way MJ, Heong KL. The role of biodiversity in the dynamics and management of insect pests of tropical irrigated rice—a review. Bull Entomol Res. 1994;84(4):567-587.
16. Williamsettle. Indonesian national IPM programme - Ecological supporting studies. Indonesian National IPM Programme; 1994. 17 p.
17. Yadav M, Prasad R, Kumari P, Madhu M, Kumari A, Pandey C, *et al*. Potential and prospects of natural enemies in rice ecosystem in Jharkhand. Int J Curr Microbiol App Sci. 2018;7:3389-3396.