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CHECKLIST OF PREDATOR FAUNA IN RICE

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ABSTRACT

The survey conducted during kharif 2018 and 2019 in rice crop to assess the biodiversity of predators revealed 37 species from 17 families belonging to six insect orders and 13 species of spiders under twelve genera under eight families. Spiders, coccinellids, damselflies and dragonflies were noticed.

Key words: Rice, ecosystem, diversity, predators, genera, species, families, spiders, coccinellids, damselflies, dragonflies

In a rice ecosystem, diversified arthropod fauna occur (Edirisinghe and Bambaradeniya, 2006), and >800 types of predators are known. These help in the regulation of pests, reduce the usage of harmful synthetic chemicals, and therefore play a pivotal role. The generalist's feeders include Coleoptera, Odonata and Hemiptera, and spiders. The predacious coleopterans include- *Microspis discolor*, *Harmonia octomaculata* (Coccinellidae); mirids *Cyrtorhinus lividipennis* and staphylinids like *Paederus fuscipes* (on planthoppers); and *Pheropsophus* sp., *Cicindela duponti*, *Cheilomenes sexmaculata* and *Coelophorabis sellata* as generalist feeders. Odonata comprising dragonflies and damselflies are the most conspicuous and swift predators (Siregar et al., 2010). Around 5000 species of Odonata are known, out of these 142 genera, 18 families and 474 species are reported in India (Subramanian, 2014). Among the other biocontrol agents, spiders are unique. Despite the low in abundance their ability to consume wide number of preys establishes them as a significant predatory complex than others. The present study surveyed the potential predators prevailing in the rice research farm of Pusa in Bihar.

MATERIALS AND METHODS

To study the biodiversity of predators in rice, a trial was conducted at RPCAU, Research farm, Pusa, Samastipur. The samples were gathered by a fine nylon material range net of 30 cm dia, with sweeping done at the canopy level including the interspaces between plants just as near base of the plants. 20 complete sweeps/ plot were made from 30 days after transplanting at weekly interval. Predatory fauna from each sample were separated and labelled in containers with 70% alcohol. The collected specimens were sent to NBAIR (ICAR-National Bureau of Agricultural Insect Resources), Bangalore for identification. Relative abundance was calculated as follows-

$$\text{Relative abundance} = \frac{\text{Total no. of individual of each species}}{\text{Total no. of individuals of all species}} \times 100$$

Species diversity was analysed through Simpson diversity index (1949) and Berger Parker dominance index (Southwood, 1978)

RESULTS AND DISCUSSION

Field surveys conducted during kharif 2018 and 2019 revealed a total of 37 species under 17 families from 6 insect orders; and 13 species of spiders under 12 genera under 8 families (Table 1; Figs. 1, 2). During 2018, spiders, coccinellids, damselflies and dragonflies were noticed from 30 days after transplanting (DAT) with a species richness of 5, which increased to 8, 16, 19, 22 and 27 at 37, 44, 51, 58 and 65 DAT, respectively; maximum value of 29 was 79 DAT when the crop attained its maturity; thereafter these values declined. In case of spiders, the relative abundance of 15% was observed. Similarly, during kharif 2019, these predators were observed from 30 DAT with a species richness of 8, which was maximum of 28 at100 DAT; maximum relative abundance from 30 DAT to 114 DAT was of the coccinellids (28%), while for spiders it was 18.4%. Simpson index (D) was maximum at 65 DAT (0.96) and the least at 30 DAT (0.59) during kharif 2018; this value gradually increased to 0.89 (37 DAT), 0.92 (44 DAT), 0.93 (51 DAT), 0.95 (58 DAT) and 0.96 (65 DAT). However, despite species richness

Table 1. Natural enemies observed in rice crop

Species	Common name	Family	Order
Agriocnemis pygmaea	Wandering wisp	Coenagrionidae	Odonata
Brachythemis contaminata	Ditch jewel	Libelluidae	Odonata
Ceriagrion cerinorubellum	Bi-coloured damsel	Coenagrionidae	Odonata
Ceriagrion coromandelianum	Yellow waxtail	Coenagrionidae	Odonata
Ceriagrion rubiae	Orange waxtail	Coenagrionidae	Odonata
Crocothemis servilia	Scarlet skimmer	Libelluidae	Odonata
Diplacodes trivialis	Ground skimmer	Libelluidae	Odonata
Ischnura nursei	Pixie dartlet	Coenagrionidae	Odonata
Neurothemis tullia	Pied paddy skimmer	Libelluidae	Odonata
Orthetrum sabina	Green marsh hawk	Libelluidae	Odonata
Paragomphus lineatus	Lined hook-tailed	Gomphidae	Odonata
Pantala flavescens	Globe skimmer	Libelluidae	Odonata
Potamarcha congener	Common chaser	Libelluidae	Odonata
Trithemis pallidinervis	Long legged marsh glider	Libelluidae	Odonata
Tholymis tillarga	Coral tailed cloudwing	Libelluidae	Odonata
Bembidion sp.	Ground beetle	Carabidae	Coleoptera
Calochroa flavomaculata	Tiger beetle	Cicindellinadae	Coleoptera
Cheilomenes sexmaculata	6 spotted ziz-zag lady bird	Coccinellidae	Coleoptera
Coccinella transversalis	Transverse lady bird	Coccinellidae	Coleoptera
Cocinellia septempunctata	Seven spot ladybird or C-7	Coccinellidae	Coleoptera
Cryptolaemus montrouzieri	Mealybug destroyer	Coccinellidae	Coleoptera
Harmonia octomaculata	Eight spotted ladybird	Coccinellidae	Coleoptera
Dytiscus	Predacious diving beetle	Dytiscidae	Coleoptera
Hydrophilus piceus	Water scavenger	Hydrophilidae	Coleoptera
Lethocerus sp.	Giant water bug	Belostomatidae	Coleoptera
Ophionea indica	Ground beetle	Carabidae	Coleoptera
Micraspis discolor	Ladybird beetle	Coccinellidae	Coleoptera
Paederus fuscipes	Rove beetle	Staphylinidae	Coleoptera
Pheropsophus bimaculatus	Bombardier beetle	Carabidae	Coleoptera
Propylea dissecta	Aphidophagous ladybird	Coccinellidae	Coleoptera
Camponotus sp.	Carpenter ant	Formicidae	Hymenoptera
Limnogonus fossarum	Water strider	Gerridae	Hemiptera
Cyrtorhinus lividipennis	Plant bug	Miridae	Hemiptera
Euborella sp.	Earwigs	Anisolabididae	Dermaptera
Forficula sp.	Earwigs	Forficulidae	Dermaptera
Odontomyia sp.	Soldier fly	Statiomyidae	Diptera
Ommatius sp.	Robber flies	Asilidae	Diptera
Argiope aemula	Oval St. Andrews cross spider	Araneidae	Araneae
Argiope pulchella	Garden cross spider	Araneidae	Araneae
Bianor albobimaculatus	Boreal jumping spider	Salticidae	Araneae
Cheiracanthium inornatum	Yellow sac spider	Cheiracanthiidae	Araneae
Lycosa pseudoannulata	Wolf spider	Lycosidae	Araneae
Neoscona theisi	Common web spider	Araneidae	Araneae
Oxypes macilentus	Lynxspider	Oxyopidae	Araneae
Pardosa sp.	Wolf spider	Lycosidae	Araneae
Plexippus sp.	Jumping spider	Salticidae	Araneae
Leucauge decorata	Decorative silver orb spider	Tetragnathidae	Araneae
Tetragnatha mandibulata	Long jawed orb weaver	Tetragnathidae	Araneae
Thomisus sp.	Crab spider	Thomisidae	Araneae
Tibellus sp.	Slender crab spider	Philodromidae	Araneae

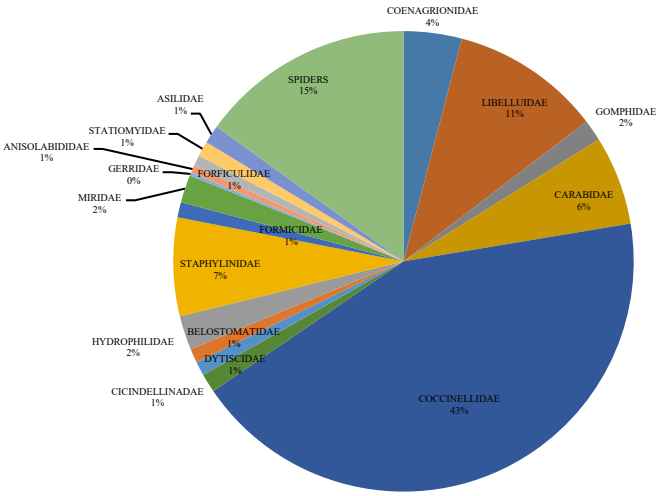

Fig. 1. Relative abundance of natural enemies in rice crop (kharif, 2018)

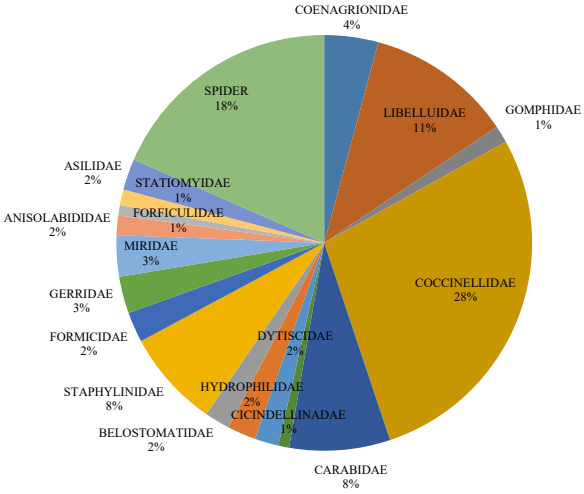

Fig 2. Relative abundance of Natural enemies in rice crop (kharif, 2019)

Table 2. Diversity indices of natural enemies in rice crop (kharif, 2018)

Crop stage (DAT)	No. of species	Abun-dance	Dominant species	d	D	Species richness	Abun-dance	Dominant species	d	D
		Kharif 2018						Kharif 2019		
30 (20 Aug)	5	33	*Coccinella transversalis*	0.54	0.59	8	55	*Paederus fuscipes*	0.50	0.70
37 (27 Aug)	8	112	*Cocinellia septempunctata*	0.19	0.89	10	48	*Paederus fuscipes*	0.41	0.79
44 (3 Sep)	16	194	*Micraspis discolor*	0.13	0.92	19	165	*Micraspis discolor*	0.20	0.87
51 (10 Sep)	19	216	*Coccinella septempunctata*	0.12	0.93	23	256	*Coccinella septempunctata*	0.14	0.89
58 (17 Sep)	22	203	*Coccinella transversalis*	0.08	0.95	23	270	*Propylea dissecta*	0.13	0.92
65 (24 Sep)	27	290	*Propylea dissecta*	0.09	0.96	28	311	*Cheilomenes sexmaculata*	0.10	0.94
72 (1 Oct)	24	219	*Micraspis discolor*	0.16	0.93	26	225	*Ophionea indica*	0.16	0.93
79 (8 Oct)	29	298	*Cheilomenes sexmaculata*	0.21	0.87	28	276	*Coccinella transversalis*	0.21	0.88
86 (15 Oct)	27	192	*Coccinella septempunctata*	0.15	0.92	26	300	*Paederus fuscipes*	0.13	0.92
93 (22 Oct)	23	254	*Ophionea indica*	0.12	0.91	25	270	*Propylea dissecta*	0.14	0.91
100 (29 Oct)	25	232	*Micraspis discolor*	0.14	0.89	28	270	*Coccinella septempunctata*	0.18	0.89
107 (5 Nov)	18	182	*Propylea dissecta*	0.18	0.88	22	240	*Propylea dissecta*	0.15	0.90
114 (12 Nov)	21	308	*Paederus fuscipes*	0.11	0.91	19	391	*Ophionea indica*	0.11	0.91

D-Simpson index

of 29 recorded at 79 DAT revealed maximum D value of 0.87 indicating comparatively low diversity and abundance of a single species. Berger Parker index at 30 DAT indicated a low diversity with the dominant species as *C. transversalis* (54%), and its least value was at 58 DAT (0.08) indicating that the abundant species constituted only 8%, thus establishing an equitable representation of different species in the collected sample. Similarly, during kharif 2019, Simpson index (D) was maximum at 65 DAT (0.94) and the least at 30 DAT (0.70) indicating maximum and minimum species diversity, respectively; species richness of 28 recorded at 79 DAT was the highest of D value (0.88), indicating comparatively low diversity and abundance of a single species. Berger Parker index at 30 DAT indicated a low diversity where dominant species *Paederus fuscipes* constituted 50%; least value was at 65 DAT (0.10) indicating that abundant species constituted only 8%,

thus establishing an equitable representation of different species in the collected sample; this index value abruptly fluctuated when the crop attained maturity stage with the dominant species being *O. indica, C. transversalis, P. fuscipes, P. dissecta, C. septempunctata, P. dissecta* and *O. indica* (Table 2).

The present findings corroborate with those of Kumar et al. (2013) who observed that staphylinid beetles, tiger beetles, ground beetles, damselflies and dragonflies were dominant in the rice crop. Vinothkumar (2013) observed 13 species of coccinellids exhibiting positive correlation with *Nilaparvata lugens* and *Nephotettix virescens*. Rahaman et al. (2014) revealed the dominance of three wolf spiders, long jawed spiders and lynx spiders. The present observations partially agree with Chakraborty (2015) who recorded 49 predators and 7 parasitoids. Harit (2015) and Shankar et al. (2018) observed that the most dominant predators were of Coleoptera. Arulprakash et al. (2017) observed 19 species of Odonata.

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