



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-

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 at 100 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
<i>Agriocnemis pygmaea</i>	Wandering wisp	Coenagrionidae	Odonata
<i>Brachythemis contaminata</i>	Ditch jewel	Libellulidae	Odonata
<i>Ceriagrion cerinorubellum</i>	Bi-coloured damselfly	Coenagrionidae	Odonata
<i>Ceriagrion coromandelianum</i>	Yellow waxtail	Coenagrionidae	Odonata
<i>Ceriagrion rubiae</i>	Orange waxtail	Coenagrionidae	Odonata
<i>Crocothemis servilia</i>	Scarlet skimmer	Libellulidae	Odonata
<i>Diplacodes trivialis</i>	Ground skimmer	Libellulidae	Odonata
<i>Ischnura nursei</i>	Pixie damselfly	Coenagrionidae	Odonata
<i>Neurothemis tullia</i>	Pied paddy skimmer	Libellulidae	Odonata
<i>Orthetrum sabina</i>	Green marsh hawk	Libellulidae	Odonata
<i>Paragomphus lineatus</i>	Lined hook-tailed	Gomphidae	Odonata
<i>Pantala flavescens</i>	Globe skimmer	Libellulidae	Odonata
<i>Potamarcha congener</i>	Common chaser	Libellulidae	Odonata
<i>Trithemis pallidinervis</i>	Long legged marsh glider	Libellulidae	Odonata
<i>Tholymis tillarga</i>	Coral tailed cloudwing	Libellulidae	Odonata
<i>Bembidion</i> sp.	Ground beetle	Carabidae	Coleoptera
<i>Calochroa flavomaculata</i>	Tiger beetle	Cicindellinae	Coleoptera
<i>Cheilomenes sexmaculata</i>	6 spotted ziz-zag lady bird	Coccinellidae	Coleoptera
<i>Coccinella transversalis</i>	Transverse lady bird	Coccinellidae	Coleoptera
<i>Coccinella septempunctata</i>	Seven spot ladybird or C-7	Coccinellidae	Coleoptera
<i>Cryptolaemus montrouzieri</i>	Mealybug destroyer	Coccinellidae	Coleoptera
<i>Harmonia octomaculata</i>	Eight spotted ladybird	Coccinellidae	Coleoptera
<i>Dytiscus</i>	Predacious diving beetle	Dytiscidae	Coleoptera
<i>Hydrophilus piceus</i>	Water scavenger	Hydrophilidae	Coleoptera
<i>Lethocerus</i> sp.	Giant water bug	Belostomatidae	Coleoptera
<i>Ophionea indica</i>	Ground beetle	Carabidae	Coleoptera
<i>Micraspis discolor</i>	Ladybird beetle	Coccinellidae	Coleoptera
<i>Paederus fuscipes</i>	Rove beetle	Staphylinidae	Coleoptera
<i>Pheropsophus bimaculatus</i>	Bombardier beetle	Carabidae	Coleoptera
<i>Propylea dissecta</i>	Aphidophagous ladybird	Coccinellidae	Coleoptera
<i>Camponotus</i> sp.	Carpenter ant	Formicidae	Hymenoptera
<i>Limnogonus fossarum</i>	Water strider	Gerridae	Hemiptera
<i>Cyrtorhinus lividipennis</i>	Plant bug	Miridae	Hemiptera
<i>Euborella</i> sp.	Earwigs	Anisolabididae	Dermaptera
<i>Forficula</i> sp.	Earwigs	Forficulidae	Dermaptera
<i>Odontomyia</i> sp.	Soldier fly	Statiomyidae	Diptera
<i>Ommatius</i> sp.	Robber flies	Asilidae	Diptera
<i>Argiope aemula</i>	Oval St. Andrews cross spider	Araneidae	Araneae
<i>Argiope pulchella</i>	Garden cross spider	Araneidae	Araneae
<i>Bianor albobimaculatus</i>	Boreal jumping spider	Salticidae	Araneae
<i>Cheiracanthium inornatum</i>	Yellow sac spider	Cheiracanthiidae	Araneae
<i>Lycosa pseudoannulata</i>	Wolf spider	Lycosidae	Araneae
<i>Neoscona theisi</i>	Common web spider	Araneidae	Araneae
<i>Oxyopes macilentus</i>	Lynxspider	Oxyopidae	Araneae
<i>Pardosa</i> sp.	Wolf spider	Lycosidae	Araneae
<i>Plexippus</i> sp.	Jumping spider	Salticidae	Araneae
<i>Leucauge decorata</i>	Decorative silver orb spider	Tetragnathidae	Araneae
<i>Tetragnatha mandibulata</i>	Long jawed orb weaver	Tetragnathidae	Araneae
<i>Thomisus</i> sp.	Crab spider	Thomisidae	Araneae
<i>Tibellus</i> sp.	Slender crab spider	Philodromidae	Araneae

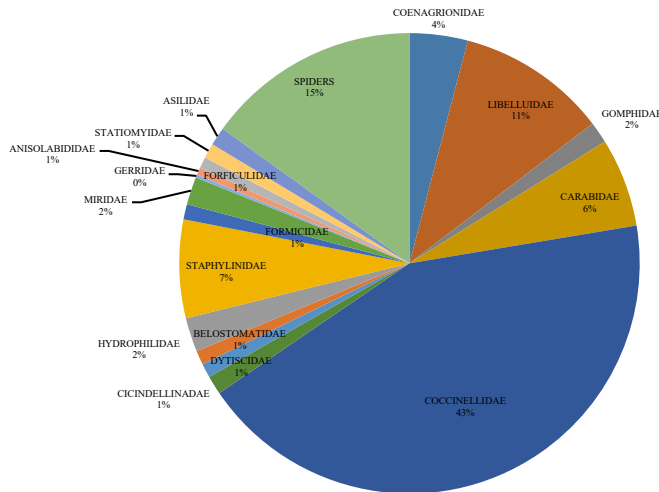


Fig. 1. Relative abundance of natural enemies in rice crop (kharif, 2018)

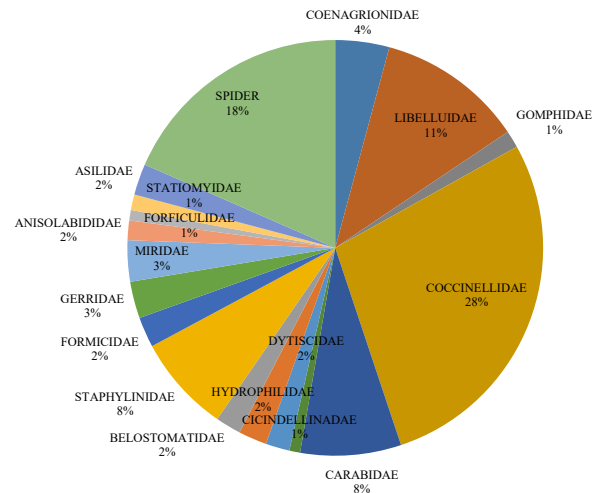


Fig 2. Relative abundance of Natural enemies in rice crop (kharif, 2019)

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

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