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ODONATA (INSECTA) DIVERSITY OF RICE FIELD HABITAT IN PALAKKAD DISTRICT, KERALA

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INTRODUCTION

Our information on the odonata (Insecta) fauna of Kerala state, south India has been confined to the works of Fraser (1933, 1934 & 1936) from Kerala part of the southern Western Ghats, Peters (1981) from the Thiruvananthapuram district, Rao and Lahiri (1982) from the Silent Valley National Park, Mathavan *et. al.* (1989) from the Periyar Tiger Reserve and Emiliyamma and Radhkrishnan (2000) from the Parambikulam Wildlife Sanctuary. There has been no comprehensive study on this insect group from the plains and wetlands of Kerala. In the present study we made an attempt to study the odonata fauna occurring in a paddy field habitat at Palakkad district of Kerala.

Rice fields are excellent habitats for the study of odoantes, as such areas are ideal foraging grounds, with more open environs, providing a large number of insect pests (prey-population) for the odonates to predate upon. Fraser (1933, 1936) mentioned 3 species of odonates from paddy fields of Bangalore. Kumar and Prasad (1977) recorded 10 species from the paddy fields of Dehradun valley. Krishnaswamy *et. al.* (1984) reported 8 species of odonates predaceous on known insect pests of paddy from Assam. Recently Gunathilagaraj *et. al.* (1999) listed 16 species from the rice fields of Coimbatore. Asaithambi and Manikarasagam (2002) recorded *Tholymis tillarga* (Fabricius) from paddy field near Annamalai University area in Tamil Nadu. Talmale and Kulkarni (2003) have reported 19 species of odonata from the paddyfield of Bhandara district of Maharashtra.

STUDY AREA

Palakkad (Palghat) is known as the 'rice bowl' of Kerala. This district, centrally located in the state, with its close proximity to Western Ghats is having extensive paddy fields. The present

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study area Nanniode, a small village, situated at Perumatty Panchayat about 25 kms south-east of Palakkad town is located at a latitude of 10° 42' N. and a longitude of 76° 47' E. Due to the influence of the Western Ghats mountain ranges and the Palakkad Gap, the area experiences a characteristic climate of severe summer with gusty winds during March to May and plenty of rains during June to November received through the both the southwest and northeast monsoons. Traditionally, two yields of crops are taken annually. The lush green paddy fields, interspersed with banana crops, coconut and Palmyra groves, and bordered with herbaceous weeds along the field bunds, contribute good habitats for the foraging odonates.

METHODOLOGY

During the current study, three field surveys spanning 20 days each were carried out in August-September, 1999 (First Harvesting Stage), December-January, 1999–2000 (Second Growing Stage), April-May, 2000 (Second Post Harvesting Stage). Only the adult odonates were collected from the paddy fields, adjoining water bodies and irrigational canals. The observations were categorized according to their abundance, as indicated below :

A = Abundant-More than 30 examples observed.

VC = Very Common 16–30 examples observed.

C = Common 4–15 examples observed.

R = Rare 1–3 examples observed.

RESULTS AND DISCUSSIONS

Altogether 21 species under 18 genera of 5 families were recorded during the study. Of these, 6 species are additions to the odonate fauna of the rice-field habitats of India. 5 species were seen throughout the study. Maximum species richness was seen during the harvesting stage. Diversity and richness of species observed in three different stages of the paddy-crop are summarized in Table 1.

GROWING STAGE

When the plant is two-month old, most of the insect pests were found active, feeding on tender shoots and leaves of the paddy plants. 5 species of damselfly and 8 species of dragonfly dominated at this time. The most common species found were *Ceriagrion coromandelianum, Ischnura aurora aurora, Orthetrum sabina sabina, Brachythemis contaminata, Diplacodes trivialis* and *Pantala flavescens.* During this stage, breeding of *Ceriagrion coromandelianum* was observed among the adjoining marsh-vegetation near paddy fields. *Copera marginipes, Vestalis gracilis, Trithemis*

Table 1. : Showing Odonata diversity in different stages of the Paddy at Palakkad.

Sl. No.	Species	Growing Stage	Harvesting Stage	Post-Harvesting Stage
	Suborder : ZYGOPTERA			
	Family : COENAGRIONIDAE			
1.	*Ceriagrion coromandelianum* Fabricius	VC	VC	A
2.	*Pseudagrion microcephalum* (Rambur)	C	–	–
3.	*Pseudagrion rubriceps* Selys	–	R	R
4.	*Aciagrion occidentale* Laidlaw	VC	–	–
5.	*Ischnura aurora aurora* (Brauer)	A	C	R
6.	*Agriocnemis pygmaea* (Rambur)	C	–	–
	Family : PLATYCNEMIDIDAE			
7.	*Copera marginipes* (Rambur)	–	R	–
	Family : LESTIDAE			
8.	*Lestes elatus* Hagen	A	–	–
9.	*Lestes malabarica* Fraser	A	–	–
	Family : CALOPTERYGIDAE			
10.	*Vestalis gracilis gracilis* (Rambur)	–	R	–
	Suborder : ANISOPTERA			
	Family : LIBELLULIDAE			
11.	*Orthetrum sabina sabina* (Drury)	A	VC	C
12.	*Potamarcha congener* (Rambur)	R	R	–
13.	*Brachythemis contaminata* (Fabricius)	VC	C	VC
14.	*Diplacodes triviallis* (Rambur)	A	VC	C
15.	*Neurothemis i. intermedia* (Rambur)	R	–	–
16.	*Trithemis aurora* (Burmeister)	R	–	–
17.	*Trithemis pallidinervis* (Kirby)	–	R	–
18.	*Rhyothemis v. variegata* (Linnaeus)	R	–	R
19.	*Pantala flavescens* (Fabricius)	VC	A	–
20.	*Tramea limbata similata* (Rambur)	–	R	–
21.	*Tholymis tillarga* (Fabricius)	–	R	–

Abbreviation : A = Abundant, C = Common, VC = Very Common, R = Rare.

pallidinervis, Tramea limbata and *Tholymis tillarga* were found in the habitat only during this stage. On many occasions, species such as *Pantala flavescens, Tholymis tillarga* and *Diplacodes trivialis* were found attracted to electric light adjacent to the paddy fields. *Pseudagrion rubriceps* and *Copera marginipes* were observed ovipositing on the submerged plants in the irrigation canal along the paddy fields.

HARVESTING STAGE

During this stage, 15 species of odonates were observed which include 7 damselflies and 8 dragonflies. Large swarms of *Pantala flavescens* were observed soaring over the mature paddy plants. Besides *Pantala flavescens*, the species commonly observed were *Ceriagrion coromandelianum, Ischnura aurora aurora, Aciagrion occidentale, Lestes elatus, L. malabarica, Orthetrum sabina sabina, Brachythemis contaminata* and *Diplacodes trivialis*. During this stage *Lestes elatus* and *L. malabarica* were observed only for a brief period of time. *Trithemis aurora, Neurothemis intermedia intermedia* were found sparingly, only for a few days. Immediately after the monsoon, the waterlogged fields were found attracting many species of odonates for breeding and foraging. Frequent courtship flights of *Ceriagrion coromandelianum* and *Aciagrion occidentale* could be noticed during this stage.

Paddy fields being temporary wetlands with periodically changing microhabitat characteristics, the odonate community exhibits variation in species diversity, in accordance with the changes. The community variation in odonates between stages of the crop indicates the seasonal fluctuation of the odonates frequenting the entire field. The present study shows that the species richness and abundance of odonates were maximum during the harvesting stage. The rain-fed field conditions and the abundance of prey species could be the reasons for the odonate diversity.

Multivolatine species such as *Ceriagrion coromandelianum, Ischnura aurora aurora, Brachythemis contaminata, Diplacodes trivialis* and *Orthetrum sabina sabina* were recorded throughout during all the stages of the crop. *O. sabina sbaina* was found to be the most voracious feeder of the insect pests as observed by Fraser (1936) and Gunathilagaraj *et. al.* (1999). According to Krishnaswamy *et. al.* (1984), *O. sabina, P. flavescens, I. aurora, A. pygmaea* and *C. coromandelianum* are predaceous odonates of rice-field habitats in Assam.

A perusal of literature and prsent study reveals that altogether 41 species of odonata occur in rice-field habitats of India (Table 2), which include 6 species recorded during the present study, for first time from a rice-field habitat. The data presented in Table 2 also reveal that the most frequent species of odonates in the rice-field ecosystem of the country are *Ceriagrion coromandelianum, Ischnura aurora, Agriocnemis pygmaea, Orthetrum sabina, Brachythemis contaminata, Crocothemis servilia* and *Pantala flavescens*.

Table 2. : Comparative biodiversity of odonates studied in rice-fields of various states in India.

Sl. No.	Species	Distributional records in India					
		I	II	III	IV	V	VI
	Family : COENAGRIONIDAE						
1.	*Ceriagrion coromandelianum* Fabricius	–	–	+	+	+	+
2.	*Ceriagrion cerinorubellum* (Brauer)	–	–	–	+	–	–
3.	*Pseudagrion microcephalum* (Rambur)	–	–	–	–	+	–
4.	*Pseudagrion rubriceps* Selys	–	–	–	–	+	–
5.	*Aciagrion occidentale* Laidlaw	–	–	–	–	+	–
6.	*Aciagrion hisopa hisopa* (Selys)	+	–	–	–	–	–
7.	*Ischnura aurora aurora* (Brauer)	–	–	+	+	+	+
8.	*Ischnura rufostigma* Selys	–	–	+	–	–	–
9.	*Ischnura senegalensis* (Rambur)	–	–	+	–	–	–
10.	*Agriocnemis pygmaea* (Rambur)	–	–	–	–	–	+
11.	*Agriocnemis rubescens* Selys	–	–	–	+	–	–
12.	*Rhodischnura nursei* (Morton)	–	+	–	–	–	–
	Family : PLATAYCNEMIDIDAE						
13.	*Copera marginipes* (Rambur)	–	–	–	–	+	+
	Family : LESTIDAE						
14.	*Lestes elatus* Hagen	+	–	–	–	+	–
15.	*Lestes malabarica* Fraser	+	–	–	–	+	–
16.	*Lestes viridulus* Rambur	–	–	–	+	–	+
17.	*Lestes umbrinus* Selys	–	–	–	–	–	+
	Family : CALOPTERYGIDAE						
18.	*Vestalis gracilis gracilis* (Rambur)	–	–	–	–	+	–
	Family : AESHNIDAE						
19.	*Gynacantha bayadera* Selys	–	–	–	–	–	+
	Family : LIBELLULIDAE						
20.	*Orthetrum sabina sabina* (Drury)	–	+	+	+	+	+
21.	*Orthetrum chrysis* (Selys)	–	–	–	+	–	–

Table 2. : *(Cont'd.).*

Sl. No.	Species	Distributional records in India					
		I	II	III	IV	V	VI
22.	*Orthetrum pruinosum neglectum* (Rambur)	–	+	–	–	–	–
23.	*Orthetrum taeniolatum* (Schneider)	–	+	–	–	–	–
24.	*Orthetrum triangulare triangulare* (Selys)	–	+	–	–	–	–
25.	*Orthetrum glaucum* (Brauer)	–	+	–	–	–	–
26.	*Poamarcha congener* (Rambur)	–	–	–	–	+	+
27.	*Brachythemis contaminata* (Fabricius)	–	+		+	+	+
28.	*Crocothemis servilia* (Drury)	–	+	+	+		+
29.	*Diplacodes trivialis* (Rambur)	–	–		+	+	+
30.	*Diplacodes nebulosa* (Fabricius)	–	–	+	–	–	–
31.	*Neurothemis tullia tullia* (Drury)	–	–	+	–	–	–
32.	*Neurothemis intermedia intermedia* (Rambur)	–	–	–	–	+	+
33.	*Trithemis aurora* (Burmeister)	–	–	–	+	+	+
34.	*Trithemis festiva* (Rambur)	–	–	–	–	–	+
35.	*Trithemis pallidinervis* (Kirby)	–	+	–	–	+	–
36.	*Rhyothemis variegata variegata* (Linnaeus)	–	–	–	–	+	–
37.	*Pantala flavescens* (Fabricius)	–	+	+	+	+	+
38.	*Tramea limbata similata* (Rambur)	–	–	–	–	+	
39.	*Tramea basilaris burmeisteri* Kirby	–	–	–	+	–	+
40.	*Tholymis tillarga* (Fabricius)	–	–	–	+	+	+
41.	*Zyxomma peteolatum* Rambur	–	–	–	–	–	+

KEY : I – Karnataka (Banglaore), II – Uthranchal (Dehra Dun), III – Assam, IV – Tamil Nadu (Coimbatore), V – Kerala (Palakkad), VI – Maharashtra (Bhandara), '+' = Present; '–' = Absent.

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REFERENCES

Asaithambi, M. and Manikarasagam, S. 2002. Odonata of Annamalai University, Annamalai Nagar, Tamil Nadu, India, *Zoos' Print J.*, **17**(2) : 704-706.

Emiliyamma, K. G. and Radhakrishnan, C. 2000. Odonata (Insecta) of Parambikulam Wildllife Sanctuary, Kerala. *Rec. zool. Surv. India*, **98**(1) : 157-167.

Fraser, F. C. 1933. *The Fauna of British India, including Ceylon and Burma. Odonata.* Vol. I., Taylor and Francis, London. 423 pp.

Fraser, F. C. 1934. *The Fauna of British India, including Ceylon and Burma. Odonata.* Vol. II., Taylor and Francis, London. 328 pp.

Fraser, F. C. 1936. *The Fauna of British India, including Ceylon and Burma. Odonata.* Vol. III., Taylor and Francis, London. 461 pp.

Gunathilagaraj, K., Soundararajan, R. P., Chithra, N. and Swamiappan, M. 1999. Odonata of rice field of Coimbatore. *Zoos' Print J.*, **14**(6) : 43-44.

Krishnaswamy, N., Chauhan, A. O. and Das, R. K. 1984. Some common predators of rice insect pest in Assam, India. *Intl. Rice res. Newsl.*, **9**(2) : 15-16.

Kumar, A. and Prasad, M. 1977. Odonata of Ponds, Tanks and Paddy fields at and around the Dehra Dun Valley. (W. Himalaya). *Newsl. zool. Surv. India*, **3**(5) : 270-273.

Mathavan, S., Miller, P. L. and Schaller, F. 1989. A collection of dragonflies (Odonata) made from Periyar National Park, Kerala, South India, in January 1988. *Soc. Int. Odonatol. Rapid comm., (Suppl.)* No. **10** : 10 pp.

Peters, G. 1981. Dry season dragonflies of Indian low lands. *Dtsch. Ent. Z.N.F.* 28, *Hett 1-111 Seite* 93-108.

Rao, K. R. and Lahiri, A. R. 1982. First records of Odonata (Arthropoda : Insecta) from Silent Valley and New Amarambalam Reserve Forests, *J. Bombay nat. Hist. Soc.*, **79** : 557-562.

Talmale, S. S. and Kulkarni, P. P. 2003. Odonata in Paddy fields of Bhandara district, Maharashtra. *Bionotes*, **5**(3) : 67-68.