

## Odonata (Insecta) Diversity of Agroecosystem, A Preliminary Study from Chalavara, Palakkad, Kerala.

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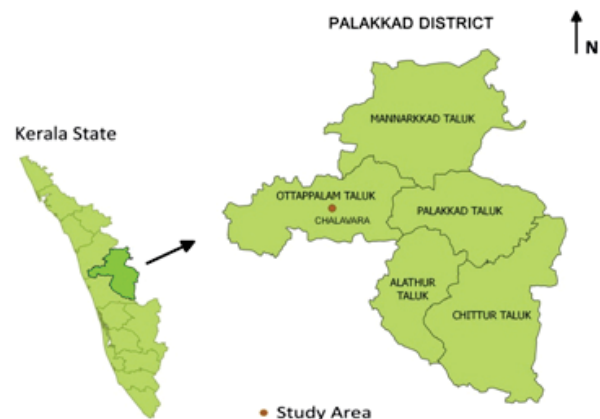
### Introduction

**D**ragonflies and damselflies, which come under the order Odonata are some of the most attractive insects found in nature. They can be commonly seen in the vicinity of different freshwater habitats such as rivers, streams, lakes, ponds and other wetland ecosystems. Being a mega diversity country, India is rich in Odonata diversity with 474 species of Odonata belonging to 142 genera and 18 families (Subramanian 2014). Out of the 174 species of Odonata found in Western Ghats (Subramanian et. al., 2011), 154 species belonging to 81 genera and 12 families were reported from Kerala (Kiren and Raju 2013). The Odonata diversity of Kerala part of Western Ghats is comparatively well documented thanks to the monumental works of Fraser (1933, 1934 & 1936). The other prominent works from this region included Rao & Lahiri (1982); Emiliyamma and Radhakrishnan (2000, 2002); Radhakrishnan & Emiliyamma (2003); Palotet.al (2005) and Kiran & Raju (2011, 2013). Of late, multiple attempts have been made to study the Odonata diversity of Kerala outside the protected areas (Nair 2015) and these studies have clearly indicated that considerable diversity of Odonata can occur outside the protected areas also. The present study is an attempt to document the Odonata of Chalavara Gramapanchayat which is an agricultural village in the Ottappalam Taluk of Palakkad District, Kerala.

Chalavara is located towards the western boundary of Palakkad district, about 45 kms from Palakkad town. The area lies between 10o82' N and 76o29' E. It has a total area of 27.9 square kilometers. Geographically it is a typical midland

village of numerous small hills interspersed with paddy fields. Hills constitute 30% of the total geographic area where as 40% is slopes and the rest 30% is plains (paddy fields).

The paddy fields form an important habitat for Odonata owing to the fact that they would hold water for about 8 months in a year thanks to the extended monsoon in the area. Even though there are no natural rivers or rivulets in this area, there are numerous water channels (13.5 km in total) flowing across the paddy fields and some of the larger channels will hold water up until early March. There are also numerous small and medium-sized ponds (numbering around 150 in total) and many of them are perennial. The water channels and ponds also serve as major habitat for Odonata



Picture 1: Study area map

### Methodology:

The Odonata of the study area were surveyed from July 2014 to July 2016. The study area was surveyed frequently for at least 5 days a week and observations were documented. Opportunistic observations were also done. Specimens were photographed in the field. Species

were primarily identified in the field with the help of standard references and field guides such as Fraser (1933, 1934 & 1936), Subramanian K.A (2009) and Kiran&Raju (2013). Experts were also consulted for confirmation of the identification. Systematic arrangement and the taxonomy followed are after Subramanian K.A(2014) and common names are after Kiran&Raju (2013). The Odonata species are categorized into the five relative abundance categories such as A - abundant (more than 30 specimens observed); VC - very common (16 to 30 specimens observed); C - common (4 to 15 specimens observed); and R - rare (1 to 3 specimens observed).

### Results and Discussion:

A total of 45 species of Odonata belonging to 32 genera and 8 families were recorded during the study. Of the 45 species documented, 16 are of the suborder Zygoptera and 29 belong to the suborder Anisoptera. Family Libellulidae has the highest representation in terms of species with a total of 26 species followed by Coenagrionidae with a total of 10 species. Families Lestidae, Calopterygidae and Gomphidae are represented by 2 species each whereas families Chlorocyphidae, Platycnemididae and Aeshnidae are represented by single species each. A checklist of species found in the study area is given in Table 1. Diversity and richness of species observed throughout the year are given in Table 2.

The most significant finding from the present study is the observation of *Lestes nodalis* from the study area. This is the only second record of the species from Kerala after Emiliyamma et al (2016) reported the species from Kozhikode. A good population of *Lestes nodalis* is observed during the months of September to February. It is interesting to note that these are observed among the undergrowth of the surrounding hill slopes; quite a distance away from the water bodies. It is worth noting that Emiliyamma et al (2016) also reported this species from identical habitat in Kozhikode. Another interesting observation is the presence of andromorph females of *Urothemis signata* and these were spotted along with normal females of the species.

It is observed that, in the study area, Odonata activity is vigorous during the months of July to September. Six species viz. *Ceragrion coromandelianum*, *Diplacodes trivialis*, *Neurothemis fulvia*, *Neurothemis tullia*, *Orthetrum sabina* and *Trithemis aurora* are observed throughout the year. Most of the species observed in the agricultural fields are also spotted in the surrounding hill slopes except for *Libellago lineata* and *Pseudagrion microcephalum*. These are found mostly along the banks of the water channels at all times. Thousands of *Pantala flavescens* flocking the afternoon sky over the paddy fields is a common sight during the months of July and August, however, movement to a particular direction has not been observed.

### Summary and Conclusion:

Kiran&Raju (2013) recorded 154 species of Odonata from Kerala. The present study shows 45 species to be present in the study area, which amounts to roughly 30% of the total Odonata species of Kerala. For a village like Chalavara where there are no natural forests present for a radius of at least 25 kilometres and the primary habitat available for Odonata is the agricultural fields, this is a remarkable number. The presence of *Lestes nodalis* in the study area reiterates the fact that a comprehensive exploration of the agricultural villages of Kerala is essential to get a complete picture of the Odonata diversity of Kerala.

A thorough understanding of Odonata diversity has much relevance for an agroecosystem. Odonata are good indicators of environmental changes as they are sensitive to changes in the habitats, atmospheric temperature and weather conditions. Also, they are biocontrol agents, many species of Odonata inhabiting agroecosystems play a crucial role in controlling pest populations (Tiple et al. 2008). From a community point of view also, Odonata has greater significance. According to Sathe and Bhusnar (2010) the species of the genera *Anax*, *Orthetrum*, *Potamarcha*, *Pantala*, *Davidioides*, *Bradinopyga*, and *Crocothemis* are very good predators of mosquitoes, *Culex*, *Anopheles* and *Aedes*. It is worth noting that species

of all except one of the above mentioned genera are quite abundant in the study area. Thus preserving the remaining paddy fields of our villages will surely have an added advantage of potential epidemic prevention.

Table 1: Checklist of Odonata from the study area

sl no.	Scientific Name	Common Name
<b>Family: Lestidae Calvert, 1907</b>		
1	<i>Lestes elatus</i> Hagen in Selys, 1862	Emerald spreadwing
2	<i>Lestes nodalis</i> Selys, 1891	
<b>Family: Calopterygidae Selys, 1850</b>		
3	<i>Vestalis apicalis</i> Selys, 1873	Black-tipped forest glory
4	<i>Vestalis gracilis</i> (Rambur, 1842)	Clear winged forest glory
<b>Family: Chlorocyphidae Cowley, 1937</b>		
5	<i>Libellago lineata</i> (Burmeister, 1839)	River heliodor
<b>Family: Platycnemididae Yakobson &amp; Bainchi, 1905</b>		
6	<i>Copera marginipes</i> (Rambur, 1842)	Yellow bush dart
<b>Family: Coenagrionidae Kirby, 1890</b>		
7	<i>Aciagrion occidentale</i> Laidlaw, 1919	Green striped slender dartlet
8	<i>Agriocnemi spieris</i> Laidlaw, 1919	White dartlet
9	<i>Agriocnemi spygmaea</i> (Rambur, 1842)	Pigmy dartlet
10	<i>Agriocnemi splendidissima</i> Laidlaw, 1919	Splendid dartlet
11	<i>Ceriagrion cerinorubellum</i> (Brauer, 1865)	Orange-tailed marsh dart
12	<i>Ceriagrion coromandelianum</i> (Fabricius, 1798)	Coromandel marsh dart

13	<i>Ceriagrion rubiae</i> Laidlaw, 1916	Orange marsh dart
14	<i>Ischnura aurora</i> (Brauer, 1865)	Golden dartlet
15	<i>Pseudagrion microcephalum</i> (Rambur, 1842)	Blue grass dart
16	<i>Pseudagrion rubriceps</i> Selys, 1876	Saffron-faced grass dart
<b>Family: Aeshnidae Leach, 1815</b>		
17	<i>Gynacantha dravida</i> Lieftinck, 1960	Brown darner
<b>Family: Gomphidae Rambur, 1842</b>		
18	<i>Ictinogomphus rapax</i> (Rambur, 1842)	Common clubtail
19	<i>Paragomphus lineatus</i> (Selys, 1850)	Common hooktail
<b>Family: Libellulidae Leach, 1815</b>		
20	<i>Acisomapanor poides</i> Rambur, 1842	Trumpet tail
21	<i>Aethriamant abbrevipennis</i> (Rambur, 1842)	Scarlet marsh hawk
22	<i>Brachythemis contaminata</i> (Fabricius, 1793)	Ditch jewel
23	<i>Bradinopyga geminata</i> (Rambur, 1842)	Granite ghost
24	<i>Cratilla lineata</i> Foerster, 1903	Emerald-banded skimmer
25	<i>Crocothemis servilia</i> (Drury, 1770)	Ruddy marsh skimmer
26	<i>Diplacodes nebulosa</i> (Fabricius, 1793)	Black tipped ground skimmer
27	<i>Diplacodes trivialis</i> (Rambur, 1842)	Ground skimmer
28	<i>Hydrobasileus croceus</i> (Brauer, 1867)	Amber winged marsh glider

29	<i>Indothemis carnatica</i> (Fabricius, 1798)	Black scrub glider
30	<i>Lathrecista asiatica</i> (Fabricius, 1798)	Asiatic blood tail
31	<i>Neurothemis fulvia</i> (Drury, 1773)	Fulvous forest skimmer
32	<i>Neurothemis intermedia</i> (Rambur, 1842)	Ruddy meadow skimmer
33	<i>Neurothemis tullia</i> (Drury, 1773)	Pied paddy skimmer
34	<i>Orthetrum chrysis</i> (Selys, 1891)	Brown backed red marsh hawk
35	<i>Orthetrum glaucum</i> (Brauer, 1865)	Blue marsh hawk
36	<i>Orthetrum luzonicum</i> (Brauer, 1868)	Tricoloured marsh hawk
37	<i>Orthetrum sabina</i> (Drury, 1770)	Green marsh hawk

38	<i>Pantala flavescens</i> (Fabricius, 1798)	Wandering glider
39	<i>Potamarcha congener</i> (Rambur, 1842)	Yellow tailed ashy skimmer
40	<i>Rhodothemis rufa</i> (Rambur, 1842)	Rufous marsh glider
41	<i>Rhyothemis variegata</i> (Linnaeus, 1763)	Common picturewing
42	<i>Tetrathemis platyptera</i> Selys, 1878	Pigmy skimmer
43	<i>Tholymis tillagra</i> (Fabricius, 1798)	Coral tailed cloud wing
44	<i>Trithemis aurora</i> (Burmeister, 1839)	Crimson marsh glider
45	<i>Urothemis signata</i> (Rambur, 1842)	Greater crimson glider

Table 2: Diversity and richness of Odonatathroughout the year.

sl no	Name of Species	Dry months				Pre-monsoon & southwest monsoon months				Northeast monsoon & post-monsoon months			
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	<i>Lestes elatus</i>	R				C	VC	VC	A	VC	VC	VC	C
2	<i>Lestes nodalis</i>	R	R							C	VC	VC	C
3	<i>Vestalis apicalis</i>								R	R	R		
4	<i>Vestalis gracilis</i>	R						C	C	C	R	R	
5	<i>Libellago lineata</i>	C	R				C	A	A	A	A	VC	VC
6	<i>Copera marginipes</i>	C	R				C	A	A	A	A	VC	VC
7	<i>Aciagrion occidentale</i>					C	C	C	VC	C	C	R	
8	<i>Agriocnemi spieris</i>						C	VC	VC	C	C	R	
9	<i>Agriocnemi spygmaea</i>						C	VC	VC	C	C	C	

10	<i>Agriocnemis splendidissima</i>							R	C	R			
11	<i>Ceriagrion cerinorubellum</i>	R				R	C	VC	VC	VC	C	C	
12	<i>Ceriagrion coromandelianum</i>	C	R	R	R	R	C	A	A	A	A	VC	C
13	<i>Ceriagrion rubiae</i>							R	R	R	R		
14	<i>Ischnura aurora</i>					R	R	C	C	R	R		
15	<i>Pseudagrion microcephalum</i>					R	C	C	C	C	R	R	
16	<i>Pseudagrion rubriceps</i>						C	VC	C	C	C	R	
17	<i>Gynacantha dravida</i>					R	R	C	C	R	R		
18	<i>Ictinogomphus rapax</i>	R					R	VC	VC	VC	C	C	R
19	<i>Paragomphus lineatus</i>	R					C	VC	C	C	C	R	R
20	<i>Acisomapanor poides</i>						R	R	R	R			
21	<i>Aethriamant abbrevipennis</i>	C	R			R	A	A	VC	VC	C	C	C
22	<i>Brachythemis contaminata</i>	R					R	R	C	A	A	C	C
23	<i>Bradinopyga geminata</i>	R					R	R	VC	VC	R	R	R
24	<i>Cratilla lineata</i>						R	R	R				
25	<i>Crocothemis servilia</i>	C	R			R	A	A	A	A	VC	C	C
26	<i>Diplacodes nebulosa</i>						VC	VC	VC	R	R		
27	<i>Diplacodes trivialis</i>	C	R	R	R	R	A	A	A	A	VC	VC	C
28	<i>Hydrobasileus croceus</i>					R	R	VC	A	VC	C	C	
29	<i>Indothemis carnatica</i>					R	R	R					
30	<i>Lathrecista asiatica</i>	R					R	VC	VC	VC	C	C	R
31	<i>Neurothemis fulvia</i>	VC	R	R	R	R	A	A	A	VC	VC	VC	VC
32	<i>Neurothemis intermedia</i>	R					R	C	A	A	VC	VC	C

33	<i>Neurothemis tullia</i>	VC	R	R	R	R	VC	A	A	A	A	A	VC
34	<i>Orthetrum chrysis</i>	R				R	VC	A	A	A	VC	VC	C
35	<i>Orthetrum glaucum</i>	R						R	R	R			
36	<i>Orthetrum luzonicum</i>	C					R	VC	A	A	VC	C	C
37	<i>Orthetrum sabina</i>	C	R	R	R	R	C	A	A	A	VC	VC	VC
38	<i>Pantala flavescens</i>	R				R	C	A	A	A	A	A	VC
39	<i>Potamarcha congener</i>	R				R	R	VC	A	A	VC	VC	C
40	<i>Rhodothemis rufa</i>	R	R					R	C	R	R	R	
41	<i>Rhyothemis variegata</i>	R				R	R	R	VC	VC	VC	R	R
42	<i>Tetrathemis platyptera</i>	R					R	A	A	VC	C	C	
43	<i>Tholymis tillagra</i>	R		R		R	A	A	A	VC	C	C	C
44	<i>Trithemis aurora</i>	C	R	R	R	R	A	A	A	A	VC	VC	VC
45	<i>Urothemis signata</i>								R	R	R	R	



*Lestes elatus*



*Lestes nodalis*



*Vestalis apicalis*



*Vestalis gracilis*



*Libellago lineata*



*Copera marginipes*



*Aciagrion occidentale*



*Agriocnemi spieris*



*Agriocnemi spygmaea*



*Agriocnemi splendidissima*



*Ceriagrion cerinorubellum*



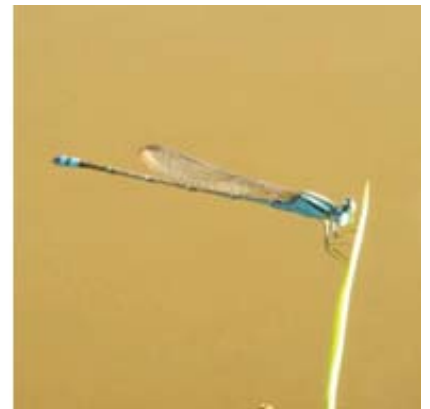
*Ceriagrion coromandelianum*



*Ceriagrion rubiae*



*Ischnura aurora*



*Pseudagrion microcephalum*



*Pseudagrion rubriceps*



*Gynacantha dravida*



*Ictinogomphus rapax*



*Paragomphus lineatus*



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*Cratilla lineata*



*Crocothemis servilia*



*Diplacodes nebulosa*



*Diplacodes trivialis*



*Hydrobasileus croceus*



*Indothemis carnatica*



*Lathrecista asiatica*





*Neurothemis fulvia*



*Neurothemis intermedia*



*Neurothemis tullia*



*Orthetrum chrysis*



*Orthetrum glaucum*



*Orthetrum luzonicum*



*Orthetrum sabina*



*Pantala flavescens*



*Potamarcha congener*



*Rhodothem isrufa*



*Rhyothem isvariegata*



*Tetrathemis platyptera*

*Tholymis tillagra**Trithemis aurora**Urothemis signata* –  
*andromorph* female

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