

A PRELIMINARY CHECKLIST OF ODONATES IN KERALA AGRICULTURAL UNIVERSITY (KAU) CAMPUS, THRISSUR DISTRICT, KERALA, SOUTHERN INDIA

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The order Odonata, which comprise of dragonflies and damselflies are one of the fascinating groups of insects. Because of their amphibious life history, relatively short generation time, high trophic position, and diversity, odonates are considered as an important component of freshwater ecosystems as well as good indicators of ecosystem health (Corbet 1993; Clark & Samways 1996). There are numerous studies from the world, which have documented that odonates respond to anthropogenic activity and thus may serve as useful indicators of habitat quality in terms of species occurrence and distribution (Kadoya et al. 2004; Flenner & Sahlen 2008). Globally 5,952 species of odonates have been reported, of which 474 species in 142 genera and 18 families are known from India (Subramanian 2014). Western Ghats has 174 species of odonates (Subramanian et al. 2011), while 154 species of odonates have been reported from Kerala (Kiran & Raju 2011, 2013). Fraser in his three volume treatises (1933, 1934 & 1936) on the odonates

of the Indian subcontinent gave a detailed account of the odonates of Kerala also. The odonate fauna of Kerala is well documented, some of the prominent works include Peters (1981), Rao & Lahiri (1982), Prasad (1987), Mathavan & Miller (1989), Radhakrishnan (1997), Emiliyamma & Radhakrishnan (2000, 2002), Palot et al. (2002), Subramanian & Sivaramakrishnan (2002), Radhakrishnan & Emiliyamma (2003), Emiliyamma et al. (2005), Subramanian (2005, 2007), Kiran & Raju (2011, 2013) which provided information regarding the status and distribution of odonates in different parts of Kerala.

Study area: The Kerala Agricultural University (KAU) main campus is located at Vellanikkara, Thrissur District, Kerala (Fig. 1). The area lies between 10°32'–10°33'N and 76°16'–76°17'E, with an average altitude of 50m. KAU campus is located very close to the Peechi-Vazhani Wildlife Sanctuary, Western Ghats, the aerial distance of which is not more than 5km. The campus has a total area of 391.44ha and the major habitats include garden lands, botanical garden, plantations of rubber, coconut, plantain, cocoa and orchards of mango, jack, sapota and guava. The campus is also enriched with various aquatic habitats like ponds, marshes, paddy fields, tanks etc. (Appendix 1). KAU campus enjoys a moderate climate. The last 10 year mean minimum temperature is 23.3°C and 10 year mean maximum of 31.8°C. The area receives south-west and north-east monsoons, the greater portion of the rainfall, however is received from the south-west monsoon between June and September. The mean annual rainfall is 2,763mm. The mean number of rainy days per year is 110 days (KAU weather station



ISSN
Online 0974–7907
Print 0974–7893

OPEN ACCESS

DOI: <http://dx.doi.org/10.11609/JoTT.o3491.6127-37> | **ZooBank:** urn:lsid:zoobank.org:pub:07F4F866-20B6-406B-80AB-97D4767221D2

Editor: K.A. Subramanian, Zoological Survey of India, Kolkata, India.

Date of publication: 26 July 2014 (online & print)

Manuscript details: Ms # o3491 | Received 17 January 2013 | Final received 08 June 2014 | Finally accepted 18 June 2014

Citation: Adarsh, C.K., K.S. Aneesh & P.O. Nameer (2014). A preliminary checklist of odonates in Kerala Agricultural University (KAU) campus, Thrissur District, Kerala, southern India. *Journal of Threatened Taxa* 6(8): 6127–6137; <http://dx.doi.org/10.11609/JoTT.o3491.6127-37>

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Funding: Kerala Agricultural University.

Competing Interest: The authors declare no competing interests.

Acknowledgements: We thank C.G. Kiran and David Raju, who confirmed the identification of odonates. We thank Sreehari R, for helping us in the preparation of the map. The authors thank the three anonymous reviewers and the subject editor for their critical comments which greatly improved the manuscript. We also thank the Dean, College of Forestry, Kerala Agricultural University for encouragement and support.



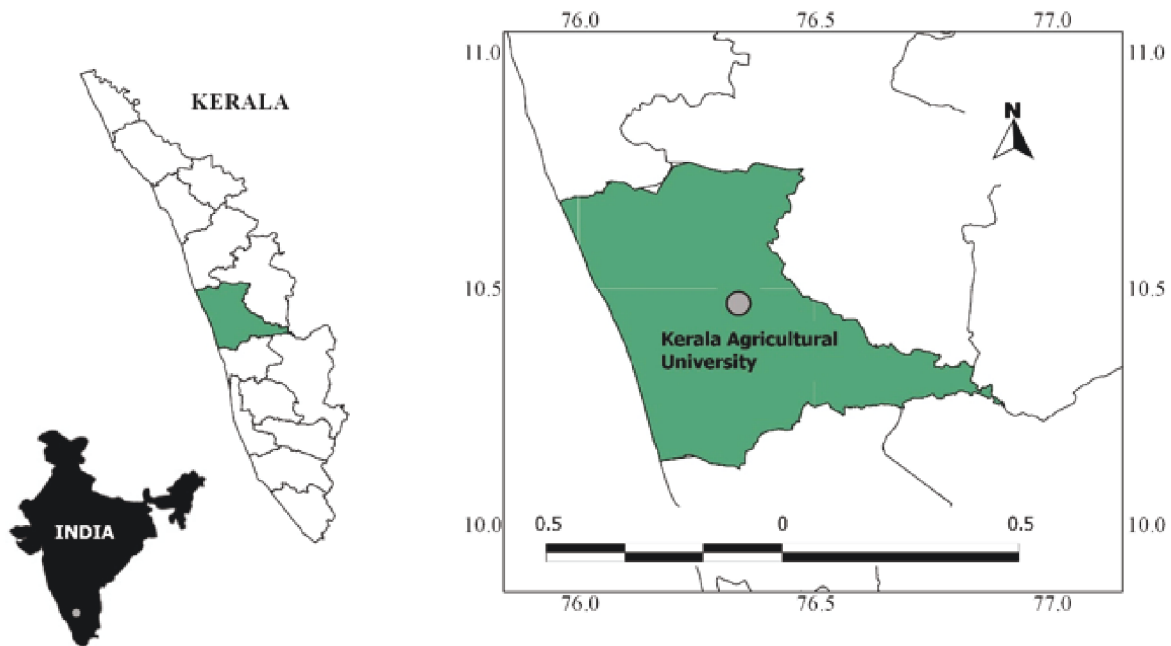


Figure 1. Location map of Kerala Agricultural University campus, Vellanikkara, Thrissur, Kerala

2012).

Methods: The odonates of the Kerala Agricultural University campus were studied for one year from February 2011 to March 2012. Surveys were conducted throughout the campus to cover all the habitats. Observations were done over three seasons viz., summer (March to May), monsoon (June to October) and winter (November to February). Individual specimens were photo-documented and these images were cross-checked with standard references and field guides on odonates such as Fraser (1933, 1934 & 1936), Subramanian (2005, 2009) and Kiran & Raju (2013). Systematic arrangement and the taxonomy followed in the checklist is after Subramanian (2014) and common names after Subramanian (2009). The odonate species were categorized into the five relative abundance categories such as very common (VC), those which were sighted during 80-100 % of the field days, common (C) (60–79 %), occasional (O), (40–59 %) and rare (R), (20–39 %) and very rare (VR) for those that was sighted only less than 19% of the field days.

Results: A total of 52 species of odonata including 36 species of Anisoptera (dragonflies) and 16 species of Zygoptera (damselflies) were recorded from the Kerala Agricultural University main campus, Thrissur, Kerala (Table 1). The Libellulidae (29sp.) was the dominant family among Anisoptera followed by Aeshnidae (3sp.) and Gomphidae (3sp.). Among the Zygoptera

the dominant family was Coenagrionidae (8sp.) followed by Calopterygidae (2sp.), Lestidae (2sp.) and Platynemididae (2sp.). The family wise distribution of odonates is given in Fig. 2 and Fig. 3.

The relative abundance analysis shown that 21 species out of 52 were found to be occasional, 13 were common, 10 very common, seven rare and one very rare. Among Anisoptera, Green Marsh Hawk *Orthetrum sabina* (Drury, 1770) and Common Picture Wing *Rhyothemis variegata* (Linnaeus, 1763) were the most common species, whereas among the Zygoptera, Yellow Bush Dart *Copera marginipes* (Rambur, 1842) were the common ones. The odonate diversity did not vary much between the different seasons at KAU campus during the study period (Fig. 4).

Discussion: Kiran & Raju (2011) reported 154 species of odonates from Kerala. The present study on the odonates of KAU main campus revealed the presence of 52 species, which accounts 33.76% of total species of odonates found in Kerala. The two dominant families of odonates at KAU campus are Libellulidae, accounting for 29 species and Coenagrionidae with eight species. Earlier studies on the Kerala odonates from other regions also have reported Libellulidae as the dominant odonate family (Emiliyamma & Radhakrishnan 2000, 2002; Emiliyamma 2005; Emiliyamma et al. 2005). The higher species diversity of odonates in KAU campus may be attributed to the diverse ecosystems including

Table 1. Checklist of odonates recorded from Kerala Agricultural University campus, Thrissur, Kerala

	Common Name	Family/Scientific name	Image no.	IUCN status	Abundance
A.	Zygoptera (Damselflies)				
	Spread Wing	Lestidae			
1	Emerald Spread wing	<i>Lestes elatus</i> Hagen in Selys, 1862	1	LC	R
2	Sapphire Eyed Spread wing	<i>Lestes praemorsus</i> Hagen in Selys, 1862	2	LC	O
	Glories	Calopterygidae			
3	Black-tipped Forest Glory	<i>Vestalis apicalis</i> Selys, 1873	3	LC	O
4	Clear Winged Forest Glory	<i>Vestalis gracilis</i> (Rambur, 1842)	4	LC	C
	Stream Jewel	Chlorocyphidae			
5	River Heliodor	<i>Libellago lineata</i> (Burmeister, 1839)	5	LC	R
	Torrent Darts	Euphaeidae			
6	Black Torrent Dart	<i>Dysphaea ethela</i> Fraser, 1924	6	DD	O
	Bamboo Tail	Platycnemididae			
7	Yellow Bush Dart	<i>Copera marginipes</i> (Rambur, 1842)	7	LC	VC
8	Black Bambootail	<i>Prodasineura verticalis</i> (Selys, 1860)	8	LC	R
	Marsh Dart	Coenagrionidae			
9	White Dartlet	<i>Agriocnemis pieris</i> Laidlaw, 1919	9	LC	C
10	Pigmy Dartlet	<i>Agriocnemis pygmaea</i> (Rambur, 1842)	10	LC	O
11	Orange-tailed Marsh Dart	<i>Ceriagrion cerinorubellum</i> (Brauer, 1865)	11	LC	O
12	Coromandel Marsh Dart	<i>Ceriagrion coromandelianum</i> (Fabricius, 1798)	12	LC	C
13	Orange Marsh Dart	<i>Ceriagrion rubiae</i> Laidlaw, 1916	13		O
14	Golden Dartlet	<i>Ischnura aurora</i> (Brauer, 1865)	14	LC	O
15	Blue Grass Dartlet	<i>Pseudagrion microcephalum</i> (Rambur, 1842)	15	LC	O
16	Saffron-faced Blue Dart	<i>Pseudagrion rubriceps</i> Selys, 1876	16	LC	O
B	Anisoptera (Dragonflies)				
	Darners	Aeshnidae			
17	Blue Darner	<i>Anax immaculifrons</i> Rambur, 1842	17		VR
18	Parakeet Darner	<i>Gynacantha bayadera</i> Selys, 1891	18	LC	R
19	Brown Darner	<i>Gynacantha dravida</i> Lieftinck, 1960	19	DD	R
	Clubtails	Gomphidae			
20	Spotted Lyretail	<i>Heliogomphus promelas</i> (Selys, 1873)	20	NT	R
21	Common Clubtail	<i>Ictinogomphus rapax</i> (Rambur, 1842)	21	LC	O
22	Common Hooktail	<i>Paragomphus lineatus</i> (Selys 1850)	22	LC	C
	Torrent hawks	Macromiidae			
23	Common Torrent Hawk	<i>Epophthalmia vittata</i> Burmeister, 1839	23	LC	O
	Skimmers	Libellulidae			
24	Trumpet Tail	<i>Acisoma panorpoides</i> Rambur, 1842	24	LC	O
25	Scarlet Marsh Hawk	<i>Aethriamanta brevipennis</i> (Rambur, 1842)		LC	C
26	Rufous-backed Marsh Hawk	<i>Brachydiplax chalybea</i> Brauer, 1868	25	LC	C
27	Little Blue Marsh Hawk	<i>Brachydiplax sobrina</i> (Rambur, 1842)	26		C
28	Ditch Jewel	<i>Brachythemis contaminata</i> (Fabricius, 1793)	27&28	LC	VC
29	Granite Ghost	<i>Bradinyopyga geminata</i> (Rambur, 1842)	29	LC	VC
30	Black-tipped Ground Skimmer	<i>Diplacodes nebulosa</i> (Fabricius, 1793)	30	LC	C
31	Ground Skimmer	<i>Diplacodes trivialis</i> (Rambur, 1842)	31	LC	VC
32	Black Scrub Glider	<i>Indothemis carnatica</i> (Fabricius, 1798)	32	NT	C

	Common Name	Family/Scientific name	Image no.	IUCN status	Abundance
33	Amber-winged Marsh Glider	<i>Hydrobasileus croceus</i> (Brauer, 1867)		LC	O
34	Asiatic Blood Tail	<i>Lathrecista asiatica</i> (Fabricius, 1798)	33	LC	O
35	Fulvous Forest Skimmer	<i>Neurothemis fulvia</i> (Drury, 1773)	34&35	LC	VC
36	Pied Paddy Skimmer	<i>Neurothemis tullia</i> (Drury, 1773)	36&37	LC	VC
37	Brown-backed Red Marsh Hawk	<i>Orthetrum chrysis</i> (Selys, 1891)	38	LC	O
38	Blue Marsh Hawk	<i>Orthetrum glaucum</i> (Brauer, 1865)	39	LC	O
39	Tricoloured Marsh Hawk	<i>Orthetrum luzonicum</i> (Brauer, 1868)	40	LC	O
40	Crimson-tailed Marsh Hawk	<i>Orthetrum pruinosum</i> (Burmeister, 1839)	41	LC	C
41	Green Marsh Hawk	<i>Orthetrum sabina</i> (Drury, 1770)	42	LC	VC
42	Wandering Glider	<i>Pantala flavescens</i> (Fabricius, 1798)	43	LC	VC
43	Yellow-tailed Ashy Skimmer	<i>Potamarcha congener</i> (Rambur, 1842)	44	LC	C
44	Rufous Marsh Glider	<i>Rhodothemis rufa</i> (Rambur, 1842)	45&46	LC	VC
45	Common Picture Wing	<i>Rhyothemis variegata</i> (Linnaeus, 1763)	47&48	LC	VC
46	Crimson Marsh Glider	<i>Trithemis aurora</i> (Burmeister, 1839)	49	LC	O
47	Pigmy Skimmer	<i>Tetrathemis platyptera</i> Selys, 1878	50	LC	R
48	Coral-tailed Cloud Wing	<i>Tholymis tillarga</i> (Fabricius, 1798)	51&52	LC	C
49	Black Marsh Torter	<i>Tramea limbata</i> (Desjardins, 1832)	53	LC	O
50	Long Legged Marsh Glider	<i>Trithemis pallidinervis</i> (Kirby, 1889)	54	LC	C
51	Greater Crimson Glider	<i>Urothemis signata</i> (Rambur, 1842)	55	LC	O
52	Brown Dusk Hawk	<i>Zyomma petiolatum</i> Rambur, 1842	56	LC	O

LC - Least concern; NT - Near Threatened; DD - Data Deficient; VC - Very Common; C - Common; O - Occasional; R - Rare; VR - Very Rare.

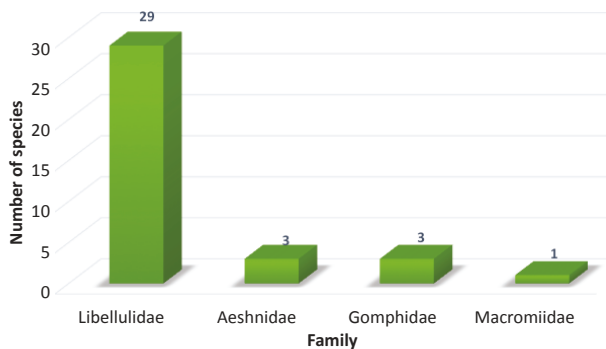


Figure 2. Family wise distribution of dragonflies (Anisoptera) in KAU Campus

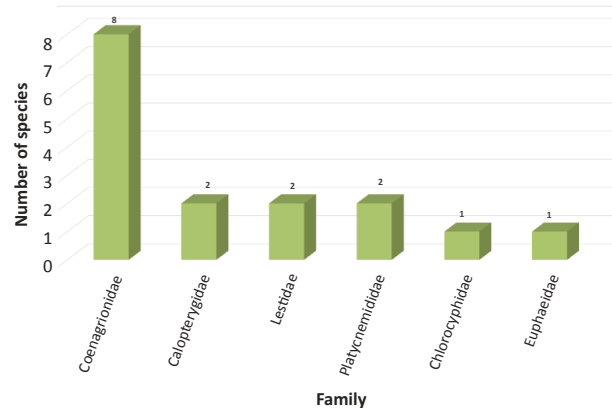


Figure 3. Family wise distribution of damselflies (Zygoptera) in KAU Campus

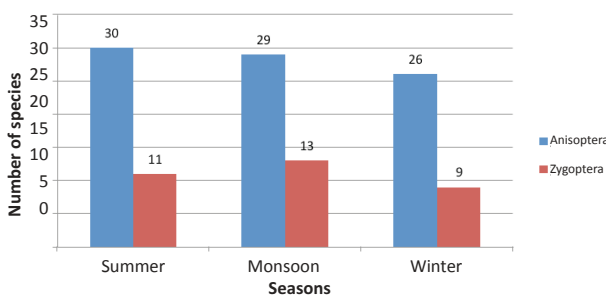


Figure 4. Species richness of odonates across the three seasons (summer, monsoon and winter)

agriculture fields and the water bodies present in the campus. Sharma et al. (2007) reported that species diversity of odonates would be higher in a diversified ecosystem. This study also reported two Near Threatened species such as *Heliogomphus promelas* (Selys, 1873) and *Indothemis carnatica* (Fabricius, 1798). The present study reiterates the significance of KAU main campus in conserving the biodiversity of the region. Earlier studies on the fauna of KAU main campus

have reported 135 species of birds (Nameer et al. 2000) and 139 species of butterflies (Aneesh et al. 2013). This is quite significant and thus emphasizing importance of university campuses in biodiversity conservation.

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Image 1. *Lestes elatus*



Image 2. *Lestes praemorsus*



Image 3. *Vestalis apicalis*



Image 4. *Vestalis gracilis*



Image 5. *Libellago lineata*



Image 6. *Dysphaea ethela*



Image 7. *Copera marginipes*



Image 8. *Prodasineura verticalis*



Image 9. *Agriocnemis pieris*



Image 10. *Agriocnemis pygmaea*



Image 11. *Ceriagrion cerinorubellum*



Image 12. *Ceriagrion coromandelianum*



Image 13. *Ceriagrion rubiae*



Image 14. *Ischnura aurora*



Image 15. *Pseudagrion microcephalum*



Image 16. *Pseudagrion rubriceps*



Image 17. *Anax immaculifrons*



Image 18. *Gynacantha bayadera*



Image 19. *Gynacantha dravida*



Image 20. *Heliogomphus promelas*



Image 21. *Ictinogomphus rapax*



Image 22. *Paragomphus lineatus*



Image 23. *Epophthalmia vittata*



Image 24. *Acisoma panorpoides*



Image 25. *Brachydiplax chalybea*



Image 26. *Brachydiplax sobrina*



Image 27. *Brachythemis contaminata* (female)



Image 28. *Brachythemis contaminata* (male)



Image 29. *Bradinopyga geminata*



Image 30. *Diplacodes nebulosa*



Image 31. *Diplacodes trivialis*



Image 32. *Indothemis carnatica*



Image 33. *Lathrecista asiatica*



Image 34. *Neurothemis fulvia* (female)



Image 35. *Neurothemis fulvia* (male)



Image 36. *Neurothemis tullia* (female)



Image 37. *Neurothemis tullia*(male)



Image 38. *Orthetrum chrysis*



Image 39. *Orthetrum glaucum*



Image 40. *Orthetrum luzonicum*



image 41. *Orthetrum pruinosum*



image 42. *Orthetrum sabina*



Image 43. *Pantala flavescens*



Image 44. *Potamarcha congener*



Image 45. *Rhodothemis rufa* (male)



Image 46. *Rhodothemis rufa* (female)

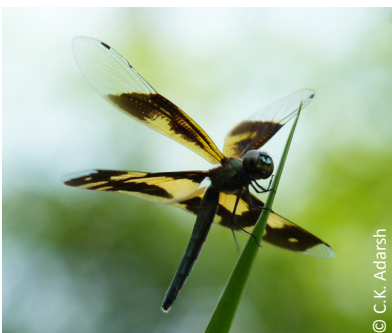


image 47. *Rhyothemis variegata* (female)



Image 48. *Rhyothemis variegata* (male)



Image 49. *Trithemis aurora*



Image 50. *Tetrathemis platyptera*



Image 51. *Tholymis tillarga* (female)



Image 52. *Tholymis tillarga* (male)



Image 53. *Tramea limbata*



Image 54. *Trithemis pallidinervis*



Image 55. *Urothemis signata* (male)



Image 56. *Zygomma petiolatum*



Appendix 1. Images of the water bodies in the study area.