



Abundance and diversity of Odonata in temporary water bodies of Coimbatore and Salem districts in Tamil Nadu

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Odonata, dragonflies and damselflies, constitute a small, well known order of insects that are widely distributed all over the world (Tillyard 1917). They are denizens of many aquatic ecosystems and their distribution covers a great deal of continuum from temporary to permanent water bodies (Corbet 1999; Johansson & Suhling 2004). Earlier 54 species of Odonata: Anisoptera (33) and Zygoptera (21) inhabiting temporary water bodies were recorded from different parts of India (Fraser 1933, 1934, 1936; Kumar 1973 a,b; Singh & Prasad 1976; Ram et al. 1982; Kaushik et al. 1990, 1991; Prasad 2002). But no study has been carried out so far from the temporary water bodies of Tamil Nadu, hence the present study. Odonata fauna was surveyed in 13 temporary water bodies of Salem and Coimbatore districts of Tamil Nadu.

Material and Methods: Odonata were collected from 13 temporary water bodies of Coimbatore (8) and Salem (5) districts in Tamil Nadu. In all the temporary water bodies sampled, water is present only during the rainy season (December - April) and remain dry during the summer season. Geo co-ordinates of the temporary water bodies sampled are given in Table 1. Collections were made after the north-east monsoon (January to April, 2006) and only adult Odonata was collected with the help of a sweep net (35cm dia. and 70cm ht.) by slowly

walking around the water bodies. The identity of the collected Odonata was carried out by following the keys given by Fraser (1933, 1934, 1936), Kumar & Prasad (1981), Ram et al. (1982), Barrion & Litsinger (1994) and Emiliyamma & Radhakrishnan (2000). Odonata diversity was computed using the Simpson's index (Simpson 1949).

$$\text{Simpson's index } (\lambda) = \sum_{i=1}^s n_i(n_i-1) / N(N-1)$$

Where, n_i is the number of individuals of the i^{th} species, and N is the total number of individuals in the sample

Simpson's index (λ) varies from 0 to 1. An increase in the value of the index indicates a decrease in diversity and vice-versa.

Results: Twenty-one species of Odonata (14 species of Anisoptera and seven species of Zygoptera) belonging to 17 genera under four families were recorded from 13 temporary water bodies of Coimbatore and Salem districts in Tamil Nadu (Table 2). Trees present around the temporary water bodies provide shade over the habitat. Aquatic vegetations need microclimate for their proliferation. In the study, this microclimate was provided by the trees in the form of shade.

Anisoptera dominated the temporary water bodies except in the Commonyeri tank (where both Anisoptera and Zygoptera were in equal proportion), Selvapuram tank (near equal) and Nagarajapuram tank (Zygoptera dominant) and no Zygoptera was recorded in the Boominaicken patty tank. Both Anisoptera and Zygoptera were represented by two families each viz., Gomphidae, Libellulidae (Anisoptera) and Coenagrionidae and Lestidae (Zygoptera). Of them, Libellulidae was represented by the maximum number of species (11) and individuals (317) followed by Coenagrionidae, Gomphidae and Lestidae.

Pantala flavescens (Fabricius) (Libellulidae) was the most abundant Anisoptera and *Ceriagrion coromandelianum* (Fabricius) (Coenagrionidae) the most abundant Zygoptera among the 21 species recorded. Three species of Anisoptera viz., *Diplacodes trivialis* (Rambur), *Orthetrum sabina* (Drury) and *P. flavescens* (Libellulidae) were recorded from all the 13 temporary water bodies sampled and none of the Zygoptera colonised all the temporary water bodies. Only *Ceriagrion coromandelianum* (Coenagrionidae) was present in 12 temporary water bodies. *Neurothemis tullia* (Drury) and *Rhodothemis rufa* (Rambur) (Libellulidae) were confined to Nagarajapuram tank.

Among the temporary water bodies, Utkulam Tank (Coimbatore) had the maximum number of individuals (72) and species (16) and minimum in Boominaicken Patti (Salem) (8 individuals and 4 species). Simpson's index (λ) showed maximum Odonata diversity in Kamalapuram

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Table 1 Geo coordinates of the temporary water bodies of Coimbatore and Salem districts of Tamil Nadu

Water body	District	Area (ha)	Latitude	Longitude	Shade cover	Aquatic vegetation	Water contamination
Utkulam tank	Coimbatore	50.0	11° 01'N	76° 96'E	Partial	Present	-
Perur tank	Coimbatore	15.0	11° 11'N	76° 40'E	No	Absent	-
Vedapatty tank	Coimbatore	7.0	11° 01'N	76° 96'E	No	Absent	-
Nagarajapuram tank	Coimbatore	6.0	11° 01'N	76° 96'E	High	Present	-
Kovaijudur tank	Coimbatore	5.0	11° 01'N	76° 96'E	Partial	Present	-
Ukkadam tank	Coimbatore	25.0	11° 01'N	76° 96'E	No	Absent	Discharge of sewage water
Selvapuram tank	Coimbatore	10.0	11° 01'N	76° 96'E	High	Present	-
Poosaripalayam tank	Coimbatore	3.0	11° 01'N	76° 96'E	No	Absent	-
Boominaicken patti tank	Salem	0.25	11° 39'N	78° 12'E	No	Absent	-
Commanyeri tank	Salem	7.0	11° 39'N	78° 12'E	High	Present	-
Kamalapuram tank – 1	Salem	17.0	11° 39'N	78° 12'E	Partial	Present	-
Kamalapuram tank – 2	Salem	17.0	11° 39'N	78° 12'E	Partial	Present	-
Nallagoundam patti tank	Salem	0.2	11° 39'N	78° 12'E	Partial	Present	-

tanks one and two (Salem) followed by Nagarajapuram and Utkulam tanks (Coimbatore) (Table 3). Minimum Odonata diversity was found in Ukkadam Tank (Coimbatore).

Discussion: Temporary water bodies are found throughout the world particularly in tropical countries (Williams 1997). Anisoptera was abundant in most of the water bodies sampled. This might be due to their high dispersal ability (Batzer & Wissinger 1996; Williams 1997; Lawler 2001; Kadoya et al. 2004) and their adaptability to wide range of habitats (Hodgkin & Watson 1958; Suhling et al. 2004, 2005). Less abundance of damselflies was probably due to their limited dispersal ability (Weir 1974), undulating environment afforded by the temporary water bodies (Williams 1997; Kadoya et al. 2004) and partial or absence of shade cover (Clark & Samways 1996). The abundance of damselflies in Nagarajapuram, Commanyeri and Selvapuram tanks could be attributed to the presence of shade over the habitat from the trees present around the water bodies and to the presence of aquatic vegetation. This is in confirmation with the findings of Fraser (1933) and Subramanian (2005) who revealed that shade and aquatic vegetation could favour Zygoptera more than Anisoptera. The size of the temporary water bodies determines the species richness and diversity of Odonata (Lounibos et al. 1990; Clark & Samways 1996; Stewart & Samways 1998; Schindler et al. 2003; Kadoya et al. 2004; Carchini et al. 2005; Suh & Samways 2005). The maximum Odonata diversity in Kamalapuram tanks one and two might be due to their larger size. Factors affecting Odonata species assemblage in temporary water bodies are human disturbances (modification of habitat structure) (Moore 1982; Brown 1991; Stewart &

Samways 1998; Norma-Rashid et al. 2001; Timm et al. 2001; Clausnitzer 2003; Opiel 2005a, b), contamination of water bodies (Watson et al. 1982) and the presence of predators (Williams 1987; Blaustein 1992). Minimum diversity in Ukkadam tank could be due to the discharge of sewage water into the tank and presence of insectivorous fish. The abundance of Libellulidae (Anisoptera) and Coenagrionidae (Zygoptera) in the present study might be due to their shorter life cycle and widespread distribution (Norma-Rashid et al. 2001) and tolerant to wide range of habitats (Gentry et al. 1975; Samways 1989).

Conclusion: The survey of 13 temporary water bodies revealed the occurrence of 21 species of Odonata. Odonata belonging to the family Libellulidae dominated in all the temporary water bodies except Nagarajapuram Tank (Coimbatore) which was dominated by Zygoptera. The presence of shade cover and aquatic vegetation favoured zygopteran population more than Anisoptera. *P. flavescens* (Libellulidae) was the most dominant Odonata and *D. trivialis*, *O. sabina* and *P. flavescens* were present in all temporary water bodies sampled. Maximum Odonata diversity was observed in Kamalapuram tanks one and two.

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Table 2 Distribution of Odonata in temporary water bodies of Coimbatore and Salem districts of Tamil Nadu.

Name of the species	Water body													
	Coimbatore district								Salem district					
	A	B	C	D	E	F	G	H	I	J	K	L	M	
Suborder: Anisoptera														
Gomphidae														
<i>Ictinogomphus rapax</i> (Rambur)	+	-	+	-	-	-	-	-	-	-	-	+	+	-
Libellulidae														
<i>Brachythemis contaminata</i> (Fabricius)	+	-	-	+	+	+	-	+	+	+	-	-	-	
<i>Crocothemis servilia</i> (Drury)	+	+	+	+	-	+	-	+	-	-	+	+	+	
<i>Diplacodes trivialis</i> (Rambur)	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Neurothemis tullia</i> (Drury)	-	-	-	+	-	-	-	-	-	-	-	-	-	
<i>Orthetrum sabina</i> (Drury)	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Pantala flavescens</i> (Fabricius)	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Potamarcha congener</i> (Rambur)	-	-	+	+	-	-	-	-	-	-	-	-	-	
<i>Rhodothemis rufa</i> (Rambur)	-	-	-	+	-	-	-	-	-	-	-	-	-	
<i>Tholymis tillarga</i> (Fabricius)	-	-	+	-	-	+	-	-	-	-	-	-	+	
<i>Tramea limbata</i> (Desjardins)	+	-	-	-	-	-	+	-	-	-	-	-	+	
<i>Tramea basilaris</i> (Palisot de Beauvois)	+	-	-	+	-	-	-	-	-	-	+	+	+	
<i>Trithemis aurora</i> (Burmeister)	+	+	-	-	-	-	-	-	-	-	-	+	+	
<i>Trithemis pallidinervis</i> (Kirby)	+	+	+	-	-	+	-	-	-	+	+	+	+	
Suborder: Zygoptera														
Coenagrionidae														
<i>Agriocnemis pygmaea</i> (Rambur)	+	-	-	-	+	-	-	-	-	-	+	+	-	
<i>Ceragrion coromandelianum</i> (Fabricius)	+	+	+	+	+	+	+	+	-	+	+	+	+	
<i>Ischnura aurora</i> Brauer	+	-	-	+	-	-	-	-	-	+	-	-	+	
<i>Ischnura senegalensis</i> (Rambur)	+	-	-	+	-	-	-	-	-	+	+	-	-	
<i>Pseudagrion decorum</i> (Rambur)	-	-	-	+	-	-	+	-	-	-	-	-	-	
<i>Pseudagrion microcephalum</i> (Rambur)	+	-	-	+	-	-	-	-	-	-	-	-	-	
Lestidae														
<i>Lestes elatus</i> Hagen in Selys	+	-	+	-	-	-	-	-	-	-	-	-	-	

+ - Present; - - Absent; A – Utkulam; B – Perur; C – Vedapatty; D – Nagarajapuram; E – Kovaipudur; F - Ukkadam; G – Selvapuram; H – Poosaripalayam; I - Boominaicken Patty; J – Commanyeri; K - Kamalapuram 1; L - Kamalapuram 2; M - Nallagoundam Patty

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Table 3. Species diversity (Simpson) of Odonata in temporary water bodies of Tamil Nadu

Temporary water body	Species Diversity
Utkulam tank (CBE)	0.09
Perur tank (CBE)	0.13
Vedapatty tank (CBE)	0.11
Nagarajapuram tank (CBE)	0.08
Kovaipudur tank (CBE)	0.20
Ukkadam tank (CBE)	0.24
Selvapuram tank (CBE)	0.15
Poosaripalayam tank (CBE)	0.19
Boominaicken patty tank (SA)	0.14
Commanyeri tank (SA)	0.20
Kamalapuram tank – 1 (SA)	0.07
Kamalapuram tank – 2 (SA)	0.07
Nallagoundam patty tank (SA)	0.12

CBE – Coimbatore; SA – Salem

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