Relative Abundance and Distribution of Damselflies (Sub-Order: Zygoptera) in Mysuru City, Karnataka, India

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Abstract: *The Odonata order has been indicated as relative bioindicator for assessing and monitoring environmental conditions of specific locations. A field study was conducted to find out the status, occurrence and relative abundance of damselflies (Sub-order: Zygoptera) in Mysuru city, Karnataka from April 2020 to May 2021. Sampling was done by line transect method, collected data from 4 study areas were subjected to estimate relative abundance of species. A total of 14 species under 4 families were recorded. Family Coenogrionidae was found to be the most dominant with 9 species followed by Platycnemididae and Calopterygidae with 2 species, while Lestidae with only 1 species respectively. Based on the relative abundance 6 species were uncommon, 5 species were common and 3 species were very common in occurrenceof the study areas. The result of this study provides baseline data of damselflies diversity of Mysuru city for research on their biology and conservation.*

Keywords: Damselflies, Zygoptera, relative abundance, Mysuru city, Karnataka

1. Introduction

Odonatas are one of the well-known dominant groups of freshwater and terrestrial insects. Odonatas are commonly found near water bodies like reservoirs, lakes, backwaters ponds, rivers, pools, streams and also at marshy places. The adults are terrestrial and nymphs are aquatic so their amphibious habit is an important link between aquatic and terrestrial ecosystem. Odonatas are often represents as a bioindicater species. They are valuable as good indicators of aquatic and terrestrial ecosystem health and play a vital role as prey and predator to maintain the balance of tropic level of food chain (*1, 2*). The insect order Odonata comprises dragonflies (Aniosptera) and damselflies (Zygoptera). The two groups are easy to identify; dragonflies are robust in appearance and their hind wings are broader at base than the fore wings. Damselflies are slender in appearance and the head is wider than the thorax. Their hind wings are similar to the fore wings at basal width and quadrangles. However, both the groups utilize water sources for ovipositor. The nymph of dragonflies also different from damselflies by their antennal segments and anal appendages (*3*).

The Odonata fauna was extensively described by Fraser published as first record in the Fauna of British India (*4*). In that there are 500 species of dragonflies (Anisoptera) which includes 90 genera and there are 168 species including 39 genera of damselflies (Zygoptera) from India. The monophyletic suborder Zygoptera includes 8 families represented byseveral species. Several studies emphasized on distribution and diversity of damselfly species are influence by their dispersal ability, shorter life cycle and ability to tolerate wide range of habitats (5, 6, 7). Although most of the damselflies assemblages are highly specific to habitat, they are also more susceptible to habitat alterations induced by human activities. The understanding on species richness and distribution is very important in reflecting of freshwater wetlands and ecosystem health. Hence present study aimed to explore the relative abundance and distribution of damselflies in different study areas of Mysuru city, which may be helpful for widen the knowledge of future research for effective strategy in conservation of Odonata.

Table 1: Occurrence and Percentage of relative abundance of Damselflies in study areas of Mysuru city

Sl. No	Family	Scientific name	Common name	Number of occurrence	Location sited	Relative abundance (%)	Categorization from relative abundance
1	Coenagrionidae Kirby	*Agriocnemissplendidissima*	Splendid dartlet	06	Kukarahalli lake	1.59	UC
2	Coenagrionidae Kirby	*Agriocnemispygmaea*	Pygmy dartlet	55	Ramkrishnanagar	14.52	VC
3	Coenagrionidae Kirby	*Ceriagrioncoromandelianum*	Coromandel marsh dart	70	Ramkrishnanagar	18.47	VC
4	Coenagrionidae Kirby	*Ceriagrionrubiae*	Orange marsh dart	49	Ramkrishnanagar	12.93	VC
5	Platycnemididae	*Coperamarginipes*	Yellow bush dart	23	Lingabodhi lake	6.07	C
6	Coenagrionidae Kirby	*Ischnuraaurora*	Golden dartlet	16	Ramkrishnanagar	4.23	C
7	Coenagrionidae Kirby	*Ischnurasenegalensis*	Senegal golden dartlet	36	Srirampura	9.50	C
8	Lestidae Calvert	*Lesteselatus*	Emerald spread wing	15	Ramkrishnanagar	3.96	UC
9	Lestidae Calvert	*Lestespraemorsus*	Scalloped spreadwing	15	Lingabodhi lake	3.96	UC
10	Platycnemididae	*Onychargiaatrocyana*	Black marsh dart	35	Srirampura	9.24	C
11	Coenagrionidae Kirby	*Paracercionmalayanum*	Malay lilly squatter	07	Kukarahalli lake	1.85	UC
12	Coenagrionidae Kirby	*Pseudagrionrubriceps*	Saffron faced blue dart	30	Ramkrishnanagar	7.92	C

13	CalopterygidaeSelys	*Vestalisgracilis*	Clear winged forest glory	10	Lingabodhi lake	2.64	UC
14	Coenagrionidae Kirby	*Pseudagrion decorum*	Three lined dart	12	Lingabodhi lake	3.17	UC
			Total	**379**			

Note: denotation; VC-Very Common, C-Common, UC-Uncommon.

2. Materials and Methods

To study the diversity and abundance of damselflies, the field study was carried out in several wetland areas of Mysuru City (12^0 $18'26''$ N Latitude and 76° $38'59''$ E longitude at 740msl). Water bodies of Srirampura, Kukarahalli Lake, Lingabodhi Lake and Ramkrishnanagar areas were selected for this study purpose. Survey of adult damselflies species were conducted by line transect method by slowly walking along the edge of the water bodies during 10 am to 1 pm in calm and sunny weather. In the study areas permanent transects were laid down having a length of 100mt to record the damselflies. All study areas were sampled 7 times alternatively between, April 2020 to May 2021. Several different damselflyadults assemblages have been identified with aid of photographs using digital camera (Canon EOS 1500D). Most individuals identified were being captured with an entomological sweep-net from each study areas. Data collected by direct counts during the course of odonata survey in the collection sites were classified and identified with help of field guides of Subramanian K. A.2005; 2009 [8, 9]; Jeevanjose and Vivek Chandran A, 2020 [10]. The relative abundance (%) of damselflies species is estimated according to Gutzwiller (1991) [11] with following expression of n/N X 100, where 'n' is the number of a particular damselflies species and 'N' is the total observed for all damselfly species. Based on the percentage of their relative abundance the odonata were categorized into three groups such as very common (having relative abundance above 10%). Common (having relative abundance less than 10% and above 3%); uncommon (having relative abundance less than 3% and above 1%) as proposed by Bisht et. al (12).
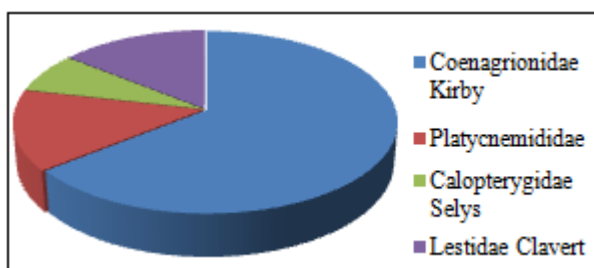

Figure 1: Families wise percentage of occurrence of damselflies in study area

3. Results and Discussion

A total of 14 species of damselflies belonging to 4 families were recorded from the study areas of Mysuru city. On the basis of family wise species occurrence the family Coenagrinidae dominated with 64% (n=9) followed by the Platycnemididae14% (n=2) and Lestidae Calvert 14% (n=2), while Calopterygidaeselys comprises 7 % (n=1), were least from total collected species (Fig.1). From the present study, it is noticed that Coenagrionidae was found to be predominated from other 3 families. This result is consistent with several odontological studies (6, 13). Among the four study areas, Ramkrishnanagar is observed with more number of damselfly species occurrences, while Kukarahalli lake was the least. The relative abundance calculated varies among the species recorded. Based on the percentage of relative abundance it was revealed that 3 species of damselfly were very common with relative abundance of 18.47 to 12.9%, while 5 species were common with relative abundance of 9.50 to 6.07%. Whereas, 6 species were uncommon with relative abundance of 3.96 to 1.85% respectively (Table.1). With reference to the IUCN categorization status all the damselfly species recorded from the study areas comes under Least Concern (LC) category.

During this study *Ceriagrioncoromandelianum, Agriocnemispygmaea* and *Ceriagrionrubiae* were most common represented species in all the areas. This could be due to their high dispersal ability and colonization around the lentic habitats. Korkeamaki and Suhonen (2002) [14] concluded that habitat specificity is the most significant factors associated with the distribution of dragonflies. Several occurrence of common species in the present study revealed that aquatic weeds, twigs of tree, amount of sunlight and humid temperature across the water bodies are some of the factors which influence perching and reproduction of dragonflies (*15, 16*). However it is worth mentioning that life history of order odonata is closely linked with water bodies. They use a wide range of aquatic vegetations and stagnant water bodies to complete their life cycle. Dragonflies are highly specific to their habitat for vast range of behaviours such as basking, foraging, roosting and sheltering. Somedamselflies use specialized habitat for their survival by avoiding predators. In the present study the uncommon species which are encountered in one study area were not found in other study areas. This might be attributed to the fact that most of the species of damselflies are restricted to suitable habitats that which are sensitive to factors such as amount of water and sunlight. During the present investigation the family Coenagrionidae represented with several species (n=9). However a single species *Vestalisgracilis* was recorded as a represented family of Calopterygidaeselys were found in less frequency. Highly restricted distribution of these species could be due to their habitat specificity around aquatic vegetations.

4. Conclusion

From the present study it is conclude that Ramakrishnanagar study area is very much diverse in fauna of damselflies. Moreover, habitat specificity has an important bearing on the distribution and ecology of odonates. Thus the present finding provides information on occurrence and relative abundance of dragonfly species in Urban setup of Mysuru city. The damselfly species recorded in the study areas may give valuable information for odonata biology and that which is useful in conservation and monitoring wetland health.

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