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Occurrence of Odonates in M. S. Swaminathan School of agriculture (MSSSoA), CUTM, Paralakhemundi campus, Odisha

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Abstract

The present investigation on occurrence of Odonates was carried out in the campus of M. S. Swaminathan School of Agriculture (MSSSoA), CUTM, Paralakhemundi during 2018-2019. A total of 21 species of Odonata including 14 species of dragonflies under 1 family – Libellulidae of Anisoptera and 7 species of damselflies under 1 family – Coenagrionidae of Zygoptera were recorded from three different types of habitats in MSSSoA campus. The species belonging to the family Libellulidae was found to be abundant with 14 species followed by the family Coenagrionidae with 7 species.

Keywords: Anisoptera, diversity, occurrence, odonata and zygoptera

1. Introduction

Odonata include both dragonflies and damselflies, known for their highly attractive colours and swift flying behaviour, may be considered as model organism in analyzing the purity of the aquatic environment. The term *Odonata* was coined by Fabricius from the Greek word, *odontos* (tooth) apparently because they have teeth on their mandibles, even though most insects also have toothed mandibles [1]. The Odonata are relatively large and often beautifully coloured insects that spend a large part of their time on the wing [2]. The immature stages are aquatic, and the adults are usually found near aquatic bodies [3]. The naiads of both dragonflies and damselflies could be easily found in comparatively clean water bodies. All stages of Odonata are predaceous and feed on various insects and other organisms and, are generally very beneficial from human point of view [2]. Thus, odonates can be considered as potential bio indicators of aquatic ecosystem as water is one of the most indispensable natural resources and is considered as a service provided by ecosystems [4] and also as efficient predator. The naiads of damselflies could be easily differentiated from dragonflies based on the presence of three gills extending in a tripod form at the end of their bodies which are absent in dragonfly naiads. Pertinent to these facts, the present investigation was carried out to observe the occurrence of odonates in MSSSoA, CUTM, Parakhemundi campus.

2. Materials and Methods

2.1 Study area

The present investigation was carried out in the campus of M. S. Swaminathan School of Agriculture (MSSSoA), Centurion University of Technology and Management (CUTM), which is located in Paralakhemundi (18.7783° N, 84.0937° E), the south-eastern region of the east Indian state of Odisha. The green campus of MSSSoA, Paralakhemundi, which is spread over a vast area, is a quiet and peaceful place, thus making it an ideal place for study of biodiversity.

2.2 Sampling

Adult Odonates were sampled for a period of one year during August, 2018 to July, 2019 in three different sampling locations viz., aquatic ecosystem, forest ecosystem and agro-ecosystem across the study area. Each study site was visited at fortnightly interval and collection of species was done by sweep net method using an insect collecting net during morning (8:00 am) and evening hours (5:00 pm) on days with fine weather conditions in all the seasons by moving along a transect.

This method has been widely used for quantitative sampling of odonates [5, 6]. The captured insects were transferred to killing jar containing chloroform. The collected as well as the preserved/pinned samples were examined under stereozoom microscope (4X and above) and identified by using standard taxonomic keys [7, 8].

2.3 Statistical analysis

Relative abundance and species richness (number of species) of odonates were also studied under aquatic, forest and agro-ecosystems. Shannon-Weiner Index (H') was calculated by using the following standard formula:

Shannon-Weiner Index (H')

Shannon-Weiner Index is a most commonly used index to determine diversity by establishing comparison between various habitats [9].

$$H' = \frac{s}{i=1} - \sum Pi \log 2 pi$$

where,

Pi = Proportion of the ith species (n_i/N)

s = Number of species

Results and Discussion

The study revealed the occurrence of 21 Odonatan species (Table 1). The sub-order Anisoptera was represented by 17 species under the family Libellulidae and sub-order Zygoptera was represented by 7 species under the family Coenagrionidae. Aquatic ecosystem was found to house the highest number of species and as many as 20 species were recorded. 15 species were recorded from agro-ecosystem and

comparatively, forest ecosystem was found to have the lowest number of species (9 species). A total of 356 numbers of individual species were recorded from all the sampling locations of MSSSoA. Based on the number of individual species collected, highest number was recorded from aquatic ecosystem (237 individuals) followed by agro-ecosystem (90 individuals). However, only 29 numbers of individuals were collected from forest ecosystem.

Nine odonatan species viz., *Brachythemis contaminata*, *Crocothemis servilia servilia*, *Rhyothemis variegata*, *Pantala flavescens*, *Orthetrum sabina*, *Orthetrum pruinosum* under family Libellulidae (sub-order: Anisoptera) and *Ischnura aurora*, *Ceriagrion coromandelianum* and *Agriocnemis pieris* under family Coenagrionidae (sub-order: Zygoptera) were found to be present in all the sampling locations. In addition to these, 11 species viz., *Urothemis signata*, *Aethriamanta brevipennis*, *Orthetrum brunneum*, *Brachydiplax chalybea*, *Neurothemis tullia*, *Neurothemis fulvia* and *Diplacodes nebulosa* under family Libellulidae and *Ischnura elegans*, *Ceriagrion calamineum*, *Agriocnemis pieris* and *Aciagrion hisopa* under family Coenagrionidae. Occurrence of 6 species in addition to 9 common species viz., *Orthetrum brunneum*, *Brachydiplax chalybea*, *Neurothemis tullia*, *Neurothemis fulvia*, *Diplacodes nebulosa* and *A. pygmaea* was observed in agro-ecosystem. The distribution and abundance of most Anisopteran and Zygopteran species were observed in aquatic ecosystem. This may be contributed by the fact that odonates prefer shallow water with emergent vegetation where they are known to oviposit endophytically [11, 12, 13]. The findings herein also suggest that open areas devoid of shady trees are preferred by odonates [13] whereas shady habitats are not preferred by them [14].

Table 1: Checklist of odonates in MSSSoA, CUTM, Paralakhemundi campus

Sl. No.	Common Name	Scientific Name	Family	Relative abundance (%)	Status
1	Orange Skimmer	<i>Brachythemis contaminata</i> (Fabricius, 1793)	Libellulidae	12.36	D
2	Common Scarlet	<i>Crocothemis servilia servilia</i> (Drury, 1773)	Libellulidae	21.35	D
3	Common Picture Wing	<i>Rhyothemis variegata</i> (Linnaeus, 1763)	Libellulidae	8.43	SD
4	Greater crimson glider	<i>Urothemis signata</i> (Rambur, 1842)	Libellulidae	2.25	R
5	Globe Skimmer	<i>Pantala flavescens</i> (Fabricius, 1798)	Libellulidae	6.18	SD
6	Scarlet Marsh Hawk	<i>Aethriamanta brevipennis</i> (Rambur, 1842)	Libellulidae	1.69	R
7	Green Marsh Hawk	<i>Orthetrum sabina</i> (Drury, 1770)	Libellulidae	6.74	SD
8	Crimson-tailed Marsh Hawk	<i>Orthetrum pruinosum</i> (Burmeister, 1839)	Libellulidae	5.34	SD
9	Southern Skimmer	<i>Orthetrum brunneum</i> (Fonscolombe, 1837)	Libellulidae	1.12	R
10	Blue Dasher	<i>Brachydiplax chalybea</i> (Brauer, 1839)	Libellulidae	0.84	SR
11	Pied Paddy Skimmer	<i>Neurothemis tullia</i> (Drury, 1773)	Libellulidae	4.78	SD
12	Fulvous Forest Skimmer	<i>Neurothemis fulvia</i> (Drury, 1773)	Libellulidae	3.09	R
13	Black-Tipped Percher	<i>Diplacodes nebulosa</i> (Fabricius, 1793)	Libellulidae	3.37	SD
14	Asian Pintail	<i>Acisoma panorpoides</i> (Rambur, 1842)	Libellulidae	0.56	SR
15	Golden Dartlet	<i>Ischnura aurora</i> (Brauer, 1865)	Coenagrionidae	1.97	R
16	Common Bluetail	<i>Ischnura elegans</i> (Linden, 1820)	Coenagrionidae	2.53	R
17	Coromandel Marsh dart	<i>Ceriagrion coromandelianum</i> (Fabricius, 1798)	Coenagrionidae	10.39	D
18	Common pond damsel	<i>Ceriagrion calamineum</i> (Lieftinck, 1951)	Coenagrionidae	3.09	R
19	White Dartlet	<i>Agriocnemis pieris</i> (Laidlaw, 1919)	Coenagrionidae	1.40	R
20	Pigmy Darlet	<i>Agriocnemis pygmaea</i> (Rambur, 1842)	Coenagrionidae	0.56	SR
21	Blue slim	<i>Aciagrion hisopa</i> (Selys, 1876)	Coenagrionidae	1.97	R

Note: RA(%) <1=Subcedent; 1.1–3.1=Recedent; 3.2–10=Subdominant; 10.1–31.6=Dominant and >31.7=Eudominant

Table 2: Different ecological indices for different sampling locations of MSSSOA

Ecological Indices	Sampling locations		
	Aquatic ecosystem	Forest ecosystem	Agro ecosystem
Total abundance (n)	237	29	90
Species richness (S)	20	9	15
Shannon-Wiener diversity index (H')	2.60	2.04	2.47

The Shannon-Wiener diversity index (H') was found to be highest in aquatic ecosystem (H'=2.60) followed by agro-ecosystem (H'=2.47) and forest ecosystem (H'=2.04). The dominant species recorded were *Crocothemis servilia servilia* (RA=21.35%), *Brachythemis contaminata* (RA=12.36%) and *Ceriagrion coromandelianum* (RA=10.39%). A total of six species were recorded as subdominant viz., *Rhyothemis variegata* (RA=8.43%), *Orthetrum sabina* (RA=6.74%), *Pantala flavescens* (RA=6.18%), *Orthetrum pruinatum* (RA=5.34%), *Neurothemis tullia* (RA=4.78%) and *Diplacodes nebulosa* (RA=3.37%). The sampling locations may be regarded to have both generalist and habitat specialist species^[3]. Most of the species which were found in all the habitats including aquatic, forest and agro-ecosystems may be regarded as widespread generalist species^[3].

5. Conclusion

Odonates including Anisopteran and Zygopteran species were found to be most abundant in aquatic ecosystem as compared to forest and agro-ecosystems which may be contributed by the fact that the immature forms of odonates are aquatic in nature. From the study, it may also be concluded that most of the species were observed in all the habitats and hence could be regarded as generalist species.

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7. References

- Mickel CE. The significance of the dragonfly name "Odonata". *Annals of the Entomological Society of America*. 1934; 27(3):411-414.
- Thangjam R, Buragohain P, Borah RK. Diversity of odonata in Jorhat district of Assam. *Indian Journal of Entomology*. 2016; 78(4):385-386.
- Baruah C, Saikia PK. Abundance and Diversity of Odonates in Different Habitats of Barpeta district, Assam, India. *International Research Journal of Biological Sciences*. 2015; 4(9):17-27.
- Dalal A, Gupta S. Aquatic insect diversity in two temple ponds of Silchar, Assam, North East India and their conservation values. *Knowledge and Management of Aquatic Ecosystems*. 2014; 9:415-29.
- Remsburg AJ. Relative Influence of Prior Life Stages and Habitat Variables on Dragonfly (Odonata: Gomphidae) Densities among Lake Sites. *Diversity*. 2011; 3:200-216.
- Fraser FC. *The Fauna of British India, including Ceylon and Burma. Odonata Vol-II* London: Taylor and Francis. 194, 398.
- Triplehorn CA, Johnson NF Borror and DeLong's *Introduction to the Study of Insects*, 7th Edition. Thompson Brooks/Cole. Belmont, California. 2005; 193-208.
- Subramanian KA, Sivaramakrishnan KG. *Aquatic insects for bio monitoring freshwater ecosystems – A methodology manual*. Ashoka Trust for Research in Ecology and Environment. 2007, 101.
- Clarke KR, Warwick RM. *Changes in marine communities: an approach to statistical analysis and interpretation*. 2nd Edition, PRIMERE: Plymouth. 2001, 172.
- Leinster T, Cobbold CA. Measuring diversity: the importance of species similarity. *Ecology*. 2012; 93(3):477-489.
- Arulprakash R, Gunathilagaraj K. Abundance and diversity of Odonata in temporary water bodies of Coimbatore and Salem districts in Tamil Nadu. *Journal of Threatened Taxa*. 2010; 2(8):1099-1102.
- Reece BA, Mcintyre NE. *Community Assemblage Patterns of Odonates Inhabiting a Wetland Complex Influenced by Anthropogenic Disturbance*. Insect Conservation and Diversity. The Royal Entomological Society. 2009.
- Baruah C, Saikia PK. Abundance and diversity of odonates in different habitats of Barpeta district, Assam, India. *International Research Journal of Biological Sciences*. 2015; 4(9):17-27.
- Remsburg AJ, Olson AC, Samways MJ. Shade Alone Reduces Adult Dragonfly (Odonata: Libellulidae) Abundance. *Journal of Insect Behaviour*. 2008; 21:460-468.