

Seasonal Variation of Odonate Diversity in Abhedha Mahal, Kota, Rajasthan, India

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ABSTRACT

Odonates are fascinating insects and important indicators of water quality and ecological health. They are key organisms of terrestrial and aquatic food webs in form of predators and preys. A study of seasonal variation and diversity of Odonates was conducted at Abhedha Mahal of Kota, Rajasthan, India in 2018 -2019. Abhedha Mahal is a tourist spot on the outskirts of Kota city with a large pond adjacent to the palace. The site has lush gardens and vegetation. Adult specimens were collected and counted by belt transect method using aerial nets. Specimens were spread, pinned and stored in insect boxes. Identification was done by Zoological Survey of India, Jodhpur, India. The study revealed a total number of 8 species of Odonates belonging to 2 families, out of which 5 species were dragonflies of family Libellulidae and 3 species were damselflies of family Coenagrionidae. *Crocothemis servilia* was most abundant and *Acisoma panorpoides* was least abundant. Abundance of Odonates was highest in monsoon and post monsoon but declined to the least in summer season. The higher Abundance can be attributed to high rainfall and humidity (83%-94%) with temperature range of 24.5°C to 29.5°C, favourable vegetation, perching sites and breeding conditions. The present study provides a baseline data of the site for further taxonomy base research and also for conservational activities. It will also increase interest in research of Odonate diversity.

KEY WORDS: ABHEDA, DIVERSITY, ODONATES, SEASONAL VARIATION, SPECIES ABUNDANCE.

INTRODUCTION

Dragonflies and damselflies are two of the most diversified creatures on the earth. Globally 5,740 species of Odonates are known out of which 474 species in 142 genera and 18 families exist in India (Subramanian, 2014). Odonates are gorgeous insects with aquatic larval forms. Both adult and larval stages are top predators and important elements of the food web (Mishra et al., 2019; Babosova et al., 2019). They serve as an umbrella

species in biodiversity conservation. They are also good bioindicators of ecological health (Jacob et al., 2017; Samways et al., 2016; Harisha and Hosetti, 2017; Sahu and Rai, 2019; Ilhamdi et al. 2020).

Kota region is a semi-arid zone of Rajasthan, India. It has many water bodies in and around the rural area which harbour a diversity of Odonates. Abhedha Mahal (25°12' N 75° 47'E) is a tourist park about 8 kms from Kota city. The palace is adjacent to a perennial pond. The palace has lush gardens and vegetation and hence very favourable for variety of Odonates. In the present study a listing of Odonates spotted on the site has been done along with study of abundance and seasonal variation. The latter has been observed in Kota area for the first time. Presently the focus was only on the terrestrial adults. Data on the aquatic larval forms may be investigated in further studies. Odonate diversity has been studied more or less from different areas of India (Das, 2016; Debata et al., 2017; Harisha and Hosetti, 2018; Uniyal et al., 2018;

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Mishra et al., 2017, 2019; Kaur et al., 2020) and in other countries (Koneri et al., 2019; Cannings, 2019; Conniff et al., 2020; Ilhamdi et al., 2020). The present study provides a baseline data of the site for further research and conservation planning. The bioindicator value of the species can be explored. Last but not the least it will also attract attention towards the group of Odonates.

MATERIAL AND METHODS

Abhedha Mahal palace is situated just adjacent to a pond and has beautiful gardens. The study was carried out in three seasons during November 2018 to October 2019. Adult Odonate collection was done by belt transect method. All visits and collection were conducted between 9:00 am to 11:00 am. Every month the insects were photographed and also samples were collected from the particular site. Temperature and humidity were also recorded monthly. For the collection of adult Odonates insect net was used. The collected Odonates were

stretched and preserved in insect boxes as per standard procedures. The insects were identified by the help of Zoological Survey of India (ZSI), Jodhpur, India.

RESULTS AND DISCUSSION

Observation revealed 8 species of Odonates in the site of Abhedha Mahal, Kota, Rajasthan. Out of the identified species 5 were dragonflies (sub-order Anisoptera) of family Libellulidae and 3 species were damselflies (sub-order Zygoptera) of family Coenagrionidae Table 1. The dragonfly *Crocothemis servilia* was the most dominant species which constituted 31.91% of the total abundance followed by *Neurothemis tullia*, *Branchythemis contaminata*, *Agriocnemis pygmaea*, *Pseudagrion sp.*, *Rhyothemis variegata*, *Ceriagrion coromandelianum* and *Acisoma panorpoides* (Figure 1). Libellulidae was the most diverse and abundant family. These observations were more or less similar with the earlier studies (Agrawal, 1957; Harinath et al., 2015; Mandal and Aditya, 2017; Bishnoi and Dang, 2019; Mishra et al., 2019).

Abundance of Odonates counted during monsoon were 453 and decreased to 308 in winter and 198 in summer. Higher Abundance can be attributed to high rainfall and humidity (83%-94%) with temperature range of 24.5°C to 29.5°C, favourable vegetation, perching sites and breeding conditions during monsoon. This seasonal variation was almost similar to that observed by other authors (Narendra et al., 2016; Thomas et al., 2018; Tuhin, 2018; Nu and Bu, 2019). *Acisoma panorpoides* was rare species spotted only in winters. On the contrary *Pseudagrion sp.* and *Rhyothemis variegata* were most abundant in summer.

Figure 1: Graphical Representation of Seasonal Variation

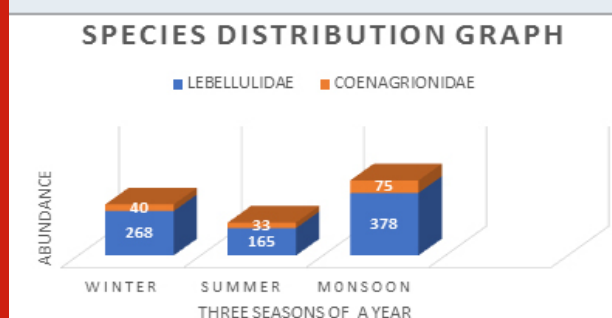


Table 1. List of Odonates in Abhedha Mahal, Kota, Rajasthan, India

S.NO	SUB ORDER	FAMILY	COMMON NAME	SCIENTIFIC NAME
1	Anisoptera	Libellulidae	Scarlet Skimmer	<i>Crocothemis Servilia</i>
2	Anisoptera	Libellulidae	Trumpet Tail	<i>Acisoma panorpoides</i>
3	Anisoptera	Libellulidae	Pied Paddy Skimmer	<i>Neurothemis tullia</i>
4	Anisoptera	Libellulidae	Ditch Jewel	<i>Branchythemis contaminata</i>
5	Anisoptera	Libellulidae	Common Picture Wing	<i>Rhyothemis variegata</i>
6	Zygoptera	Coenagrionidae	Blue Green Dart	<i>Pseudagrion sp.</i>
7	Zygoptera	Coenagrionidae	Pygmy Wisp	<i>Agriocnemis pygmaea</i>
8	Zygoptera	Coenagrionidae	Yellow Waxtail	<i>Ceriagrion coromandelianum</i>

Table 2. Seasonal Abundance of Odonates in the Abhedha Mahal, Kota, Rajasthan, India

S. No.	NAME OF THE SPECIES	SEASONAL ABUNDANCE			TOTAL ANNUAL ABUNDANCE
		WINTER (NOV-FEB)	SUMMER (MAR-JUNE)	MONSOON (JULY-OCT)	
1	<i>Crocothemis servilia</i>	93	85	128	306
2	<i>Acisoma panorpoides</i>	2	0	0	2
3	<i>Agriocnemis pygmaea</i>	36	0	55	91
4	<i>Neurothemis tullia</i>	81	11	160	252
5	<i>Ceriagrion coromandelianum</i>	3	3	0	6
6	<i>Branchythemis contaminata</i>	92	40	79	211
7	<i>Pseudagrion sp.</i>	1	30	20	51
8	<i>Rhyothemis variegata</i>	0	29	11	40
TOTAL NO OF ODONATES IN ALL FOUR SEASONS		308	198	453	959

CONCLUSION

The present study indicates that Abhedha Mahal which is situated in Kota, Rajasthan, India has a rich diversity of Odonate population. The species abundance was found to be highest in monsoon season and lowest in summer season. The most dominant and abundant family was Libellulidae of Anisoptera. Further investigation is necessary for utilizing this group of insects as bio-indicators for managing various water bodies and also used for monitoring environmental changes. Present study is a small contribution of listing and seasonal variation of Odonata of Rajasthan, India.

Conflict of Interests: None

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