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Comparative study of Odonates in two selected sites (Umed Ganj and Chatra Vilas garden) of Kota, Rajasthan (India)

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Abstract

Odonates are the insects that are commonly seen in and around water bodies. Kota district possesses many ponds and canals. Amongst them Chatra Vilas garden (near a pond) and Umed Ganj (near a canal) were selected for the present study. The study was carried out in three seasons during 2018 to 2019. The collection of adult Odonates was done by belt transect method. According to the survey, total 12 species of Odonates, belonging to two families (Libellulidae and Coenagrionidae) were identified. Species richness was same in both sites but abundance at CV Garden was greater than Umed Ganj. Umed Ganj was highly disturbed due to anthropogenic activities.

Keywords: Chatra Vilas garden, damselfly, diversity, dragonfly, species richness, Umed Ganj

Introduction

Dragonflies and damselflies are two of the most diversified creatures on the earth. Globally 5740 species of Odonates are known out of which 474 species in 142 genera and 18 families exist in India (Subramanian, 2014) ^[1]. Odonata serve as an umbrella species in biodiversity conservation. they are also good bioindicators of ecological health (Samways and Simaika, 2016; Jacob *et al.*, 2017) ^[2, 3]. In terrestrial ecosystem insect fauna represent more than 70 % and also play an important role in food chain for the natural balance (Bhandari *et al.*, 2016) ^[4]. 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. Umed Ganj [25.1336⁰ N, 75.9398⁰ E] is a bird watching site about 14 km from Kota city. whereas the CV garden [25.1523⁰ N, 75.8599⁰ E] is situated just middle of the Kota city and just adjacent to Kishor Sagar Talab. The CV Garden has very rich vegetation hence very favourable for variety of Odonates whereas Umed Ganj site was disturbed due to human activities. Even though most of the Odonate species are highly specific to a habitat, they are more susceptible to habitat alterations induced by human activities (Suhling *et al.*, 2006; Dolny *et al.*, 2012; Adu *et al.*, 2019) ^[5-7]. In the present study a listing of Odonates spotted on the sites has been done along with study of abundance. Several reports convey that the environmental and temperature conditions alter the species diversity of an area, shade and aquatic vegetation could favour Zygoptera more than Anisoptera. The availability of food sources and the presence of suitable habitat for dragonflies is a reflection of the stable ecosystem in the selected area (Agus *et al.*, 2017) ^[8].

The present study provides a baseline data of the both sites for further research. It will also attract the government to set some restriction and control human activities at Umed Ganj for conservation of nature. Umed Ganj is globally known as a bird watching site so it is necessary to prevent human activities at Umed Ganj. By this study bioindicator value of Odonates can be explored and it also attracts attention towards the group of Odonates.

Materials and Methods

Umed Ganj and CV garden are situated just adjacent to a canal and Kishor Sagar talab respectively. The study was carried out in three seasons during 2018 to 2019. The collection of adult Odonates was done by belt transect method. All visits and collections were conducted between 9.00 am to 11.00 am by help of insect nets. Every month the insects were photographed and also samples were collected from the particular sites. The collected Odonates were stretched and preserved as per standard procedures in insect boxes. The insects were identified by the help of Zoological Survey of India, Jodhpur, India.

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Table 1: Diversity And Abundance of Odonates In Cv Garden, Kota, Rajasthan, India

S.NO	Sub Order	Family	Common Name	Scientific Name	Total Annual Abundance
1	Anisoptera	Libellulidae	Little Blue Marsh Hawk	<i>Branchydiplax sobrina</i>	55
2	Anisoptera	Libellulidae	Dancing Drop Wing	<i>Trithemis pallidinervis</i>	24
3	Anisoptera	Libellulidae	Chalky Percher	<i>Diplacodes trivialis</i>	82
4	Anisoptera	Libellulidae	Scarlet Skimmer	<i>Crocothemis Servilia</i>	154
5	Anisoptera	Libellulidae	Trumpet Tail	<i>Acisoma panorpoides</i>	13
6	Anisoptera	Libellulidae	Pied Paddy Skimmer	<i>Neurothemis tullia</i>	127
7	Anisoptera	Libellulidae	Ditch Jewel	<i>Branchythemis contaminata</i>	153
8	Anisoptera	Libellulidae	Common Picture Wing	<i>Rhyothemis variegata</i>	101
9	Zygoptera	Coenagrionidae	Common Blue Tail	<i>Ischnura senegalensis</i>	46
10	Zygoptera	Coenagrionidae	Blue Green Dart	<i>Pseudagrion Sp.</i>	128
11	Zygoptera	Coenagrionidae	Pygmy Wisp	<i>Agriocnemis Pygmaea</i>	133
12	Zygoptera	Coenagrionidae	Yellow Waxtail	<i>Ceriagrion coromandelianum</i>	117
Total					1133

Table 2: Diversity and Abundance of Odonates In Umed Ganj, Kota, Rajasthan, India

S.NO	Sub Order	Family	Common Name	Scientific Name	Total Annual Abundance
1	Anisoptera	Libellulidae	Little Blue Marsh Hawk	<i>Branchydiplax sobrina</i>	16
2	Anisoptera	Libellulidae	Dancing Drop Wing	<i>Trithemis pallidinervis</i>	45
3	Anisoptera	Libellulidae	Chalky Percher	<i>Diplacodes trivialis</i>	75
4	Anisoptera	Libellulidae	Scarlet Skimmer	<i>Crocothemis Servilia</i>	43
5	Anisoptera	Libellulidae	Trumpet Tail	<i>Acisoma panorpoides</i>	3
6	Anisoptera	Libellulidae	Pied Paddy Skimmer	<i>Neurothemis tullia</i>	164
7	Anisoptera	Libellulidae	Ditch Jewel	<i>Branchythemis contaminata</i>	56
8	Anisoptera	Libellulidae	Common Picture Wing	<i>Rhyothemis variegata</i>	84
9	Zygoptera	Coenagrionidae	Common Blue Tail	<i>Ischnura senegalensis</i>	118
10	Zygoptera	Coenagrionidae	Blue Green Dart	<i>Pseudagrion Sp.</i>	27
11	Zygoptera	Coenagrionidae	Pygmy Wisp	<i>Agriocnemis Pygmaea</i>	23
12	Zygoptera	Coenagrionidae	Yellow Waxtail	<i>Ceriagrion coromandelianum</i>	45
Total					699

Results and Discussion

Observation revealed 12 species of Odonates in the site of Chatra Vilas Garden. Out of the identified species 8 were dragonflies (suborder Anisoptera) of family Libellulidae and 4 species were damselflies (suborder Zygoptera) of family Coenagrionidae (Table 1). Similarly, 12 species of Odonates in the site of Umed Ganj were observed during study (Table 2).

The dragonfly *Crocothemis servilia* was the most dominant species which constituted 13.59% of the total abundance at CV Garden (Table 1). Whereas the dragonfly *Neurothemis tullia* was the most dominant species which constituted 23.46% of total abundance at Umed Ganj (Table 2). The dragonfly *Acisoma panorpoides* was the least abundant species at both study sites. Libellulidae was the most diverse and abundant family at the CV Garden as well as Umed Ganj. These observations were more or less similar with earlier studies. (Harinath *et al.*, 2015; Mandal and Aditya, 2017; Adu *et al.*, 2019; Bishnoi and Dang, 2019; Mishra *et al.*, 2019) [9, 10,

7, 11, 12].

Abundance of Odonates counted during winter were 75 and increased to 372 in summer and 686 in monsoon at CV Garden. Whereas the abundance of Odonates counted during winter were 142 and increased to 227 in summer and 330 in monsoon at Umed Ganj. (Table 3, Figure 1). The higher abundance was due to favourable rainfall and vegetation in monsoon season at both the study sites. Similar seasonal variation was also observed in earlier studies (Narendra *et al.*, 2016; Thomas *et al.*, 2018; Tuhin, 2018; Nu and Bu, 2019) [13-16].

Due to the pollution and day by day increasing human interference at Umed Ganj the annual abundance of Odonates is decreasing and it was only 61.69% of the total annual abundance of Odonates at CV Garden. That reflects the degradation of vegetation and loss of natural habitat of Odonates. (Dolny *et al.*, 2012; Karthika and Krishnaveni, 2014; Bhandari *et al.*, 2016; Adu *et al.*, 2019) [6, 17, 4, 7].

Table 3: Comparative List of Seasonal Abundance of Odonates In Cv Garden and Umed Ganj, Kota (Rajasthan), India

S. No.	Name of The Species	Seasonal Abundance					
		Winter (Nov-Feb)		Summer (Mar-June)		Monsoon (July-Oct)	
		CV Garden	Umed Ganj	CV Garden	Umed Ganj	CV Garden	Umed Ganj
1	<i>Ceriagrion coromandelianum</i>	12	8	57	35	48	2
2	<i>Brachydiplax sobrina</i>	4	1	29	13	22	2
3	<i>Trithemis pallidinervis</i>	2	21	2	16	20	8
4	<i>Diplacodes trivialis</i>	3	21	10	4	69	50
5	<i>Neurothemis tullia</i>	21	30	18	23	88	111
6	<i>Ischnura senegalensis</i>	3	31	23	26	20	61
7	<i>Crocothemis servilia</i>	12	11	23	20	119	12
8	<i>Branchythemis contaminata</i>	6	19	91	15	56	22
9	<i>Rhyothemis variegata</i>	10	0	20	26	71	58
10	<i>Pseudagrion sp.</i>	2	0	56	27	70	0

11	<i>Agriochemis pygmaea</i>	0	0	43	22	90	1
12	<i>Acisoma panorpoides</i>	0	0	0	0	13	3
Total No Of Odonates In All Three Seasons		75	142	372	227	686	330

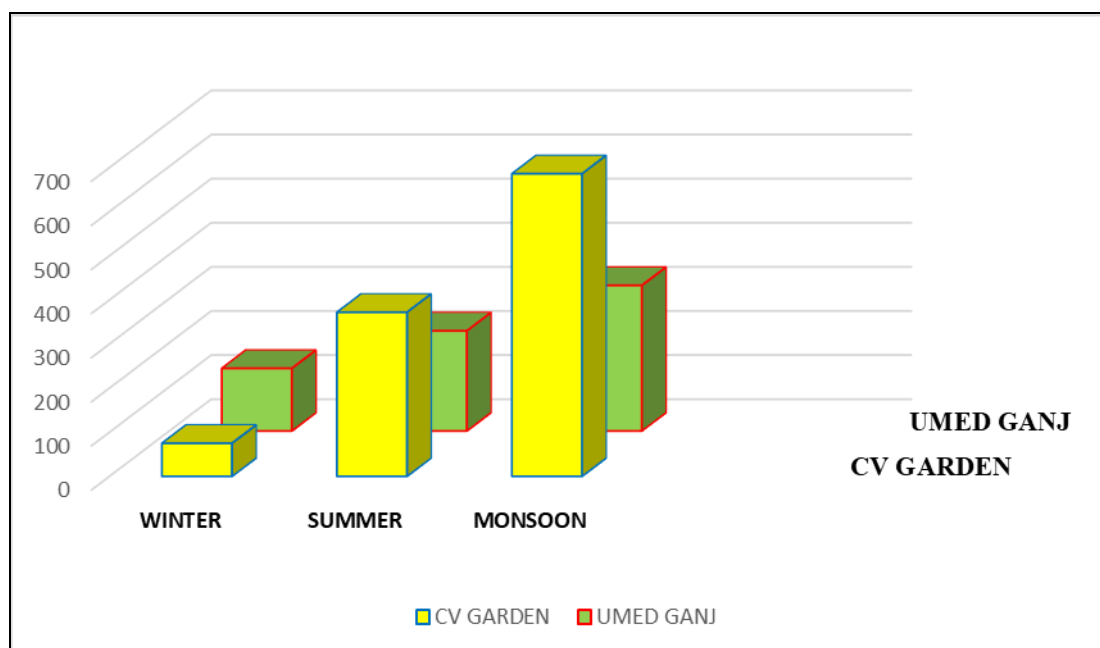


Fig 1: Graphical Representation of Seasonal Variation of Both Sites

Conclusion

The present study indicates that CV garden which is situated in the heart of Kota, city has rich diversity and abundance of Odonate population. Whereas Umed Ganj which is situated in the out skirts of Kota has lesser abundance of Odonates. The species abundance was found to be highest in monsoon season and lowest in winter season at both selected sites of Kota region. The ratio of family Libellulidae with Coenagrionidae was 2:1 at both sites that shows the Libellulidae of Anisoptera was most dominant and abundant family. The present study is a small contribution for the database of Odonates of Rajasthan, India.

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