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## **Insect Fauna of a Desert Pond Ecosystem in Churu District**

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**Abstract** - Aquatic Insects, the hardiest creatures, occur as well as flourish in aquatic ecosystems. Aquatic insects are involved in nutrient recycling. They form an important component of natural food web in aquatic ecosystems. Aquatic insects community fluctuation can provide quick information because they interact with water quality changed due to physical and chemical environment. Thus the present study was undertaken during September 2012 to February 2013 to assess the diversity of aquatic insect fauna and their relation to the physico-chemical parameters at 'Sethani ka Johra' in Churu district (27<sup>0</sup>24' N to 29<sup>0</sup>00' N latitude and 73<sup>0</sup>40' E to 75<sup>0</sup>41' E longitude).

**Physical – Chemical limnology** revealed that the Johra was shallow with turbid, alkaline, hard, slightly saline and well oxygenated water. These aquatic insects were found to be diverse, represented by 14 genera besides larval forms of many. The adult insect fauna belonged to two orders namely Coleoptera (beetles) and Hemiptera (Bugs). Coleoptera was represented by four families namely Dytiscidae (3 Genera), Hydrophilidae (2), Psephenidae (1), and Helodidae (1). Hemiptera was also represented by five families Notonectidae (2), Corixidae (2), Gerridae (1), Velidae (1) and Nepidae (1 Genera). Apart from Coleoptera and Hemiptera which were represented as adult and larval forms in these waters insects orders Diptera and Odonata were represented by larval forms.

**Key words**- *Insect fauna, Physical – Chemical limnology, Diversity, Sethani ka Johra and Ecology.*

### **I. INTRODUCTION**

The Rajasthan state is the largest state in India. In comparison to the rest of country it has different topographic characteristics. The state is located in North-West of our country. Generally, India has a tropical monsoon climate but Churu shows a typical arid climate as being a hot desert. Scarcity of water and food, dry violent winds, intense radiations, strong dust storms, wide diurnal and seasonal variations in temperature are the common characteristic features of the area. Churu where the study was carried out, situated in the middle of the shifting golden dunes, opens the gate of the Great Desert of Thar. Geographically it lies in 27<sup>0</sup> 24' N to 29<sup>0</sup> 00' latitude and 73<sup>0</sup>40'E to 75<sup>0</sup> 41'E longitude. An Indian desert fewer but varied bodies of water are present in the form of ponds, tanks, reservoirs tanks, naadis, johra, beri and bawari and few perennial lakes etc.

Aquatic ecosystem is a system in a body of water. Communities of organisms that are dependent on each other and on their environment live in aquatic ecosystem. Aquatic Insects, the hardiest creatures, occur as well as flourish in aquatic ecosystems. Insect fauna are involved in nutrient

recycling. They form an important component of natural food web in aquatic ecosystems. Aquatic macro invertebrates have been identified as excellent tool as they respond rapidly to the environmental changes. Their abundance, diversity and short life cycle makes them ideal subjects for the assessment of wetlands ecological conditions (Rader et. al., 2001). Aquatic insects community fluctuation can provide quick information because they interact with water quality changed due to physical and chemical environment. Thus the present work aimed to assess the diversity of aquatic insect fauna and their relation to the physico-chemical parameters at “Sethani ka Johra” in Churu district (27<sup>0</sup>24’ N to 29<sup>0</sup>00’ N latitude and 73<sup>0</sup>40’ E to 75<sup>0</sup>41’ E longitude).

## II. STUDY AREA

The “Sethani ka Johra” is situated in the west of Churu city at triangle of Ratangarh and Sardarshahar roads. This is man-made seasonal pond which receives rain water during monsoon. It retains water for the whole year. Smt. Brijkumari constructed this Johra in the memory of her husband Seth Bhagwan Das Bagla. It was constructed to counter the drought problem of many villages. That time the water of this Johra is used for various purpose by the inhabitants of this area viz. drinking, bathing and washing of clothes besides this the water is also used for cattle for drinking purpose.

## III. MATERIAL AND METHODS

**1. Analysis of Physical – Chemical Parameters** - The study was carried out monthly in the period of September 2012 to February 2013. Both water and sediment samples were collected from three study stations. Water was examined for the selected parameters including temperature, pH, transparency, electrical conductance, total dissolved solids, dissolved gasses (Oxygen, carbon dioxide), alkalinity and hardness. The sediment samples were examined for pH, electrical conductance, total dissolved solids and organic matter. For parameters like temperature, pH, electrical conductance and total dissolved solids respective meters were used. Transparency was recorded with the help of a standard secchi disc. Other parameters were analyzed in laboratory by using as per the standard method APHA-AWWA-WPCF (1981).

**2. Collection of Entomofauna** - The insect fauna from water were collected with plankton nets covering both macroscopic and microscopic forms. Benthic forms were collected by sieving the mud samples. They preserved in 70% alcohol for identification in the laboratory. The insect fauna were identified following Dalglish (1952), Borror & DeLong (1957), Vazirani (1964) and Mc Cafferty (1981). The result was expressed in the No. /m<sup>2</sup>.

## IV. RESULTS AND DISCUSSIONS

Physical – Chemical limnology revealed that the Johra was shallow with turbid, alkaline, hard, slightly saline and well oxygenated water. The temperature was recorded in the range of 17.5<sup>0</sup> C to 30.3<sup>0</sup> C. The average of transparency of water was 0.48 m. pH was recorded in the range of 7.2 to 8.5 m (average 8.0). The average of Turbidity was 40 JTU. The range of electrical conductivity was recorded 0.10 to 0.19 mmho/ cm. The average of total dissolved solids was 138.33 mg/l. Free CO<sub>2</sub> was nil over the study period. Dissolved oxygen was recorded 4.23 to 8.780mg/l. Hardness of water ranged from 98 to 200 mg/l and total alkalinity 40 to 94 mg/l. In sediment sample pH was recorded in the range of 7.5 to 8.4, electrical conductance 0.15 to 0.41 mmho/cm and total dissolved solids 150 to 410 mg/g. The average of organic matter was 16.42 mg/g (Table 1).

Most of the major orders of insects are found in the Indian desert and many of them present interesting adaptations to the desert environment (Roonwal 1982). In invertebrates, insects are the most versatile and tolerant group and they are also very important faunal component in desert waters, most of which are ephemeral and offer extremely hostile physical and chemical conditions. In spite of the fact that insects are no lesser important denizens of aquatic environment, no sincere efforts seem to have been made on insects fauna of the desert region of Rajasthan, except the contributions of Vazirani(1964), Tak & Sewak (1987), Tak (1996), Srivastava& Saxena (2004) and Saxena (2008). Srivastava (2009) recorded 18 insects' species in some desert pond ecosystems of Bikaner region. Bugalia, (2010) recorded 19 insect species in water of Kot Bandh in species in Northan Aravali range. Singh, (2011) reported 12 insects species besides larval forms in village pond ecosystems. These aquatic insects were found to be diverse, represented by 14 genera (Table 2) besides larval forms of many. The adult insect fauna belonged to two orders namely Coleoptera (beetles) and Hemiptera (Bugs). These entomofauna were found both water and sediment. Coleoptera was represented by four families namely Dytiscidae (3 Genera), Hydrophilidae (2), Psephenidae (1) and Helodidae (1). Hemiptera was also represented by five families Notonectidae (2), Corixidae (2), Gerridae (1), Velidae (1) and Nepidae (1 Genera). Among beetles (order - Coleoptera) *Hydrophilus olivaceous*, *Tropisternus olivaceous* (water scavenger beetles, family- Hydrophilidae), *Hydraticus fabricii*, *Dytiscus verticalis*, *Laccophilus flexuosus* (Predaceous diving beetles, family – Dytiscidae), *Eubranax* species (Riffle beetles, family – Psephenidae), *Scrites nigropunctatus* (Marsh beetles, family – Helodidae) were found and among bugs (order – Hemiptera) *Notonecta undulate*, *Notonecta glauca* (Back swimmers, family – Notonectidae), *Sigara pectoralis*, *Corixa lima* (water boatman, family – corixidae), *Gerris lacustris* (Water strider, family - Gerridae), *Microvelia* species (Riffle bugs, family – Velidae) and *Nepa cineria* (Water scorpion, family Nepidae) were found (Table- 2).

Apart from Coleoptera and Hemiptera which were represented as adult and larval forms in these waters insects orders Diptera and Odonata were represented by larval forms. These were predominantly found in both sediment and water. Chironomid larvae were recorded throughout the period of study in the mud samples of both sediment and water. Mosquito larvae (Anopheles, Culex) and larvae of Agabus were recorded throughout the period of study. In this particular observation the density of insect fauna showed distinct seasonal variation. *Hydrophilus olivaceous* density was highest and *Gerris lacustris* was lower during study period.

**Table 1- Monthly values of physico – chemical parameters of “Sethani ka Johra”, Churu during September 2012 to February 2013. Values are averages of three study stations are expressed in mg/l in water and mg/g in sediment, except otherwise mentioned.**

Parameters	Sep. 2012	Oct. 2012	Nov. 2012	Dec. 2012	Jan. 2013	Feb. 2013	Average
<b>Water</b>							
Temperture ( <sup>0</sup> C)	30.3	20.1	19.8	19.1	17.5	18.0	20.80
Transparency (m)	0.40	0.50	0.50	0.50	0.45	0.50	00.48
Turbidity (JTU)	40	40	40	40	40	40	40.00
pH	8.2	7.9	7.2	7.5	8.5	8.7	08.00
EC (mmho/cm)	0.10	0.17	0.10	0.10	0.19	0.17	00.14
TDS	100	170	100	100	190	170	138.33
DO (mg/l)	5.52	4.23	3.58	8.78	4.88	6.18	05.53
Free CO <sub>2</sub>	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Total Alkalinity (mg/l)	78	72	40	42	94	66	65.33
Hardness (mg/l)	98	152	162	200	150	160	153.67
<b>Sediment</b>							
pH	7.8	8.4	7.5	8.0	8.4	8.2	08.05
EC (mmho/cm)	0.18	0.41	0.21	0.31	0.15	0.18	00.24
TDS	180	410	210	310	150	180	240
Organic Matter (mg/l)	NIL	NIL	15.32	18.02	21.73	43.46	16.42

**Table 2- Insect fauna of “Sethani ka Johra”, Churu during September 2012 to February 2013.**

S.N.	Order	Family	Common name	Genus	Species
1	Coleoptera	Hydrophilidae	Water scavenger beetles	<i>Hydrophilus</i>	<i>olivaceous</i>
2	Coleoptera	Hydrophilidae	Water scavenger beetles	<i>Tropisternus</i>	<i>lateralis</i>
3	Coleoptera	Dytiscidae	Predaceous diving beetles	<i>Dytiscus</i>	<i>verticalis</i>
4	Coleoptera	Dytiscidae	Predaceous diving beetles	<i>Hydraticus</i>	<i>fabricii</i>
5	Coleoptera	Dytiscidae	Predaceous diving beetles	<i>Laccophilus</i>	<i>flexuosus</i>
6	Coleoptera	Psephenidae	Riffle beetles	<i>Eubranax</i>	species
7	Coleoptera	Helodidae	Marsh beetles	<i>Scrites</i>	<i>nigropunctatus</i>
8	Hemiptera	Notonectidae	Back swimmers	<i>Notonecta</i>	<i>undulate</i>
9	Hemiptera	Notonectidae	Back swimmers	<i>Notonecta</i>	<i>glauca</i>
10	Hemiptera	Corixidae	Water boatman	<i>Sigara</i>	<i>pectoralis</i>
11	Hemiptera	Corixidae	Water boatman	<i>Corixa</i>	<i>lima</i>
12	Hemiptera	Gerridae	Water striders	<i>Gerris</i>	<i>lacustris</i>
13	Hemiptera	Velidae	Riffle bugs	<i>Microvelia</i>	species
14	Hemiptera	Nepidae	Water scorpion	<i>Nepa</i>	<i>cineria</i>

## V. CONCLUSION

It is concluded that insects were hardy enough to withstand stressful conditions. The discontinuous distribution of the species is influenced by subsequent survival success and propagation. The range of various physico-chemical parameters is in tune with other records from the desert regions and thus the pond offer suitable biotopes for aquatic insects. Thus a study on insect diversity was become a reliable source to provide the picture of environmental status and influence of changing limnology of fresh water concerned.

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