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Ecological analysis of *Chironomus* larvae (Diptera: Chironomidae) collected from Ayad River in Udaipur city

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Abstract

Present study was performed to study ecology of *Chironomus* larvae found in the Udaipur region. Observation of habitat, feeding habits and their role as bioindicators in ecological monitoring was done. The pH, turbidity, temperature, chloride content, dissolved oxygen, COD and BOD were found 6.9, 28, 17 °C, 221 mg/L, 343 mg/L, 18 mg/L, 4 mg/L and 75 mg/L respectively. Their Shannon diversity index was measured is $H' = 1.21$. Their grazing and detritivorous feeding habits were shown by their gut analysis.

Keywords: *Chironomus*, Udaipur.

1. Introduction

The Chironomids, often called non biting midges or blind mosquitoes, are abundant and widespread aquatic insects. These insects spend the greatest part of their life cycle in larval form, occupying a wide range of habitats. Chironomids are one of the most dominant, widespread and diverse aquatic invertebrate taxa in freshwater systems. Chironomids have an important role in aquatic food webs, representing a major link between producers, such as phytoplankton and benthic algae and secondary consumers. The biology, ecology and morphology of Chironomidae provide crucial information needed to better understand our freshwater biodiversity. However Chironomids have not been studied in Udaipur region due to their non-biting habits, lack of awareness of the presence and value of freshwater ecosystems. This study would give a deeper insight on the biodiversity of freshwater ecosystem in Udaipur region. No reports are available for Chironomids of this region. So this work would enhance the knowledge on the biology of Chironomids in this region.

2. Materials and methods

Samples of *Chironomus* larvae were collected from a single site at the shore of Ayad River which runs in the centre of Udaipur city situated in the Rajasthan State, India. It represents a freshwater lentic habitat. Sieve (11 cm in diameter) with 0.5 mm pore size was used for collection of larvae. Jenway turbidity meter, digital pH meter and digital thermometer were used to measure turbidity, pH and temperature of water sample, respectively. Classical titration method was used to analyze the BOD, COD, chloride content and total alkalinity. Digital thermometer was used to measure temperature. Winkler method is used to measure dissolved oxygen. Gut analysis was performed by dissecting their gut by hand. Shannon diversity index was calculated by ORIGIN software for Windows 7.

3. Results and Discussion

Chironomus larvae were collected from the shore of Ayad River (24°35'13" N and 73°42'39" E). Collected larvae were sent to the taxonomic laboratory of RCA, Maharana Pratap Agriculture University for their taxonomic identification which confirmed it as *Chironomus* Meigen, 1803. This river is also the dumping zone for domestic effluents of the nearby city. So it was predicted that environmental contaminants may present in the river, which was later found true by BOD and COD tests. There were 152 individual *Chironomus* counted in per m² area with a mean length of 4 mm. *Chironomus* were then preserved in 70% alcohol and taken to the laboratory with water sample for further analysis. First their ecological analysis was

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done. The pH, turbidity, temperature, chloride content, total alkalinity, dissolved oxygen, COD and BOD were found 6.9, 28, 17 °C, 221 mg/L, 343 mg/L, 18 mg/L, 4 mg/L and 75 mg/L respectively. Their Shannon diversity index was measured is $H' = 1.21$. Furthermore their gut analysis was done to study their feeding habits. The major food items found in their guts were mud, plant debris and algae. It was noted that algal bloom was present in the river in which this larvae inhabits. Presence of *Chironomus* in large number clearly indicates that river is contaminated because their red colour is due to haemoglobin which is an adaptation to live in low oxygen environment. So these larvae may use as ecological bioindicators in this city. At the end of the experiments *Chironomus* larvae were fixed in DPX and then deposited to the Museum of Department of Zoology, University College of Science, Mohanlal Sukhadia University, Udaipur, Rajasthan, India.

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