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Diversity of aquatic insects in Semara Taal, a wetland of district Siddharthnagar, U.P.

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Abstract

The present study deals with the aquatic insects survey conducted from March 2018 to May 2018 in Semara Taal. This study enumerated 20 different species belonging to 6 orders and 19 families. Order Hemiptera represent the highest number of species (8 genera) followed by Diptera (4 genera), Coleoptera (3 genera), Odonata (2 genera), Ephemeroptera (2 genera), and Trichoptera (single genus). Dominance of Hemipteran, Odonata and Coleoptera insects suggested that the Semara taal is relatively less polluted.

Keywords: Diversity; Aquatic Insects fauna; wetland, Semara Taal.

Introduction

Biodiversity plays an important role in the function of an ecosystem by providing many services like nutrients and water cycling, soil formation and retention, resistance against invasive species, pollination of plants, regulation of climate, as well as pest and pollution (Prakash, 2017) [7]. Biodiversity has definite levels and values (Verma, 2016) [10]. The genetic diversity acts as buffer in biodiversity (Verma, 2017a) [11]. It helps in maintaining the ecological balance which is necessary for widespread of biodiversity and its loss has great ecological impact (Kumar and Verma, 2017; Verma, 2017b) [4, 12]. Environmental ethics for biodiversity conservation is not sufficient and it needs to be redefining (Verma, 2017c) [13].

All over the world about 45000 species of insects are known to inhabit diverse freshwater ecosystem (Balaram, 2005) [1]. Aquatic insect are extremely important in ecological systems for many reasons and are the primary bio-indicators and occupies the freshwater bodies such as lakes, ponds, wetland, streams and rivers. They serve various purposes such as food of fishes and other invertebrates, as vectors of pathogens to both humans and animals. Bio-monitoring pertains to the use of insects and/or their differential responses to stimuli in their aquatic habitat to determine the quality of that environment (Majumder *et al.*, 2013) [5].

Aquatic insects form an important component of the food chain and energy flow pathways and comprise of a high proportion of biomass in fresh water ecosystems. At the larval stage, they constitute the principal nutritive fauna of fish and are known to play a significant role in the processing and cycling of nutrients as they belong to several feeding groups such as filter feeders, deposit collectors and predators (Resh and Rosenberg, 1984) [8].

Wetlands support vast biodiversity of flora and fauna, provide food and shelter to organisms that thrive in. They occur where the water table is at or near the surface of the land, or where the land is covered by water. Wetlands are among the world's most productive environments (Verma and Prakash, 2018) [14]. Wetlands are extremely suitable ecosystems to assess the effect of climate change on the density of aquatic insects. Inland wetlands of India serve as the habitat for more than 500 species of aquatic insects which are mainly from Ephemeroptera (mayflies), Odonata (dragonflies) and Trichoptera (caddisflies), (Subramanian and Sivaramakrishnan, 2007) [8].

Aquatic insects are good indicators of human impact on the freshwater ecosystem (Wetzel, 1983) [15]. They are suited for use in environmental impact assessment (EIA) and has a long tradition in water quality monitoring (Bonada *et al.*, 2005) [2] act as reliable indicators. The insect order Ephemeroptera, Plecoptera and Trichoptera are the pollution sensitive groups and are used extensively for aquatic insect biomonitoring programmes (Bonada *et al.*, 2005) [2]. The metrics prepared for biomonitoring programme consider species diversity is more sensitive to stress than total number of taxa, since the insect orders Ephemeroptera, Plecoptera and Trichoptera taxa includes generally in tolerant taxa.

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Many species require undisturbed habitats, thus a high number of insect order Ephemeroptera, Plecoptera and Trichoptera taxa indicates good water quality.

Aquatic insects are probably best known for their ability to indicate the water quality in a particular environment. If a sample of the aquatic insects in a particular place is analyzed, in terms of sensitive kind versus tolerant kinds one can get a good measure of the environmental health. There is scanty information on the abundance and diversity of aquatic insects in freshwater bodies of eastern Uttar Pradesh, therefore, the present work was undertaken to study the diversity of aquatic insects of Samera Taal, a wetland of tarai region of eastern Uttar Pradesh.

Materials and Methods

Study area was the Semara Taal, a wetland under exploration is situated in Shohratgarh tahsil of district Siddharthnagar of Uttar Pradesh. It is situated between the latitude 27.4025°N-82.9597°E. The total area of this taal is 466.66 acre. The maximum depth of water in the pond is 15 feet during monsoon and minimum 5 feet in summer. The Taal is enriched with several types of macrophytes.

Aquatic insects were collected using dipnet (0.3 x 0.3m) having mesh size 500µ for a period of one year, March to May, 2018. A random sampling of a 50m reach was taken for collecting insect samples. A total of 10 dippings or 10 kicking were carried out along the length of the sampling reach. The collected material was washed by running water through the

nets two or three times to detach the insects/larvae adhered in the nets. The samples were then transferred to white trays in small quantities for handpicking aquatic insects using forceps and fine brushes. The handpicked samples were then preserved in 95% ethyl alcohol and brought to the laboratory for further analysis. Before preserving natural colour of insects were noted. The collected samples were examined under a dissecting microscope and identified with the help of Book entitled “Aquatic insect of India- A field Guide” and “A guide to the study of fresh water biology” written by Subramanian & Sivaramakrishnan (2007) [8] and Needham and Needham (1962) [6] and other standard literature and other standard taxonomic keys. The family level identification was done according to proper insect manual.

Results and Discussion

The present investigation indicated that wetland, Semara Taal is rich in aquatic insect fauna. During the present study a total of 20 species of aquatic insects belonging to 6 orders and 19 families have been recorded from the three sampling sites of the study sites. Among the aquatic insects collected from Semara Taal the order Hemiptera (8 genera) was dominant and followed by order Diptera (4 genera), Coleoptera (3 genera), Odonata (2 genera), Ephemeroptera (2 genera), and Trichoptera (single genus) (Table 1). Choudhary and Janakahi (2015) [3]. Reported 12 species of aquatic insects from Lakhabanjara Lake, Sagar. The insect of the order hemiptera, diptera and coleoptera showed high species richness.

Table 1: Diversity of aquatic insect in Semara Taal during study period

S. N.	Order	Family	Zoological Name
1	Hemiptera (40%)	Belostomidae	<i>Diplonychus</i> sp.
2		Hydrometridae	<i>Hydrometra</i> sp.
3		Gerridae	<i>Gerris</i> sp.
4			<i>Limnognonis</i> sp.
5		Corixidae	<i>Sigara</i> sp.
6		Notonectidae	<i>Notolecta</i> sp.
7		Vellidae	<i>Microvelia</i> sp.
8.		Pleidae	<i>Neoplea</i> sp.
9	Diptera (20%)	Chironomidae	<i>Chironomus</i> Larvae
10		Culicidae	<i>Aedes</i> sp.
11		Anophilinae	<i>Anophiles</i> sp.
12		Ephidridae	<i>Ephydra</i> sp.
13	Coleoptera (15%)	Hydrophilidae	<i>Tropisternus</i> sp.
14		Dytiscidae	<i>Laccophilus</i> sp.
15		Gyrinidae	<i>Dineutus</i> sp.
16	Odonata (10%)	Coenagrionidae	<i>Enallagma</i> sp.
17		Petaluridae	<i>Tachopteryx</i> sp.
18	Ephemeroptera (10%)	Leptophlebiidae	<i>Leptophlebia</i> sp.
19		Baetidae	<i>Baetis</i> sp.
20	Trichoptera (5%)	Hydropsychidae	<i>Hydropsyche</i> sp.

Overall species diversity revealed that the insects belong to order Hemiptera were dominant and that of Trichoptera was the least dominant in the wetland. Aquatic insect taxa from orders Trichoptera, Ephemeroptera and Odonata were very low in diversity contributing only 5 and 10 %, however the taxa from orders Hemiptera, Diptera and Coleoptera were found dominant throughout the study period with a percentage composition of 40%, 20 % and 15 %, respectively. In the present study, the presence of pollution sensitive groups (Ephemeroptera and Trichoptera) indicates that health of wetland was not healthy. Dominance of Hemipteran, Odonata and Coleoptera insects suggested that the Semara taal is relatively less polluted. The results of the present study

revealed greater diversity of aquatic insects in Semara Taal with a possibility of water pollution and suggest effectively for stringent biomonitoring programmes.

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