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Aquatic Insects of Some Swamps of Rajshahi University Campus and Their Role on Fish Culture

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Abstract: Studies on the aquatic insects of some swamps in Rajshahi University campus were made for a period of 12 months from November, 2001 to October, 2002. The insect population mainly consists of Coleoptera, Diptera, Hemiptera and Epimeroptera. The highest number of insects were recorded during November and December, 2001 and from February to May, 2002. A total of 18 genera under 13 families and 4 orders were identified. Some hemipterans (Corixidae, Gerridae, Nepidae and Hydrometridae) and dipterans were surface dwellers, Notonectidae of order Hemiptera were middle dwellers and others were bottom dwellers. The investigation of natural fish production was also considered. From the above investigation, it is concluded that the insect population in swamps was very high and it can be used as natural food for fish culture.

Key words: Swamp, aquatic insect, role, food, fish culture

INTRODUCTION

Swamps are potential water bodies for expending fish culture^[1]. Rahman *et al.*^[1] defined the swamp as one of those type of lentic water which forms link between terrestrial and aquatic ecosystem. The Space Research and Remote Sensing Organization (SPARRSO) reported that the total area of ponds in Bangladesh is 1,61,943 ha. The number of ponds varied between 13,42,000 to 17,69,000 and among the ponds the percentage of swamps is 19 to 34.

Aquatic entomology is an interesting as well as important branch of freshwater biology, which is still mostly untouched in Bangladesh. The role of insects in water bodies has recently become a matter of great concern to fishery biologists.

Insects are one of the most conspicuous forms of life in water bodies occurring in tremendous numbers and they form an important link in food chain of the aquatic environment. Insects are an important element in the food of some pond fisheries. While some insects compete with fish for food to the detriment for the mortality of small fishes and fry.

In scientific culture and management of fisheries resources, there is a great need for the understanding of insects and the role they play in the aquatic environment.

Further, insects, insecticides and fisheries have become so much linked together that it is difficult to think of the development of inland fisheries without some consideration given to insects. Several researchers studied aquatic insects Dewan^[2], Lansbury^[3], Miyamoto^[4] and Usinger^[5].

The results of the present investigation are expected to be helpful to the fishery biologists and fish culturists in the efficient management of our freshwater fisheries and in particular, pond fisheries.

MATERIALS AND METHODS

The present study comprises collection, description and identification of the aquatic insects occurring in 4133.38 m² area of swamps in Rajshahi University Campus during the period of November, 2001 to October, 2002.

A total of four different types of nets were used in the collection of insect samples, but their basic design was the same. A plankton net was used to sample the small-sized floating insects of open waters. Larger bugs and beetles were captured with the help a standard sized cast-net. The mosquito larvae and pupae were readily collected from just under the surface film with a hand-dipper. The common type of bottom-sampler was used in collecting bottom-dwelling insects.

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After collection, specimen were transferred to the laboratory preserved in 70% alcohol in suitable specimen jars.

Identification of the insect specimens was made up to genus level using keys given by Usinger^[5].

RESULTS AND DISCUSSION

Naturally, total fish production from different swamps ranged from 296.41 to 330.30 kg ha⁻¹ and the average was 309.78 kg ha⁻¹ (Table 3).

In course of the present survey of the aquatic and semiaquatic insects in swamps, 18 genera of insects covering 13 families and 4 orders were identified (Table 1), with a number of insects remaining unidentified. There were higher insect populations during March-May, 2002 (Table 2).

The major groups of insects recorded during the study were the coleopterans, dipterans, hemipterans and ephemeropterans. This was similar with the observations made by Dewan^[2].

The numerical abundance of insects during the study period, though varying considerably, did not show any abrupt fluctuation from month to month. A general impression formed about their relative prevalence is that most of the insect groups were abundantly found during the period from December, 2001 to April, 2002 and they were fewer in number in November, 2001, June, 2002 and July, 2002. Similar fluctuations in insects abundance have been reported by Usinger^[5] and Weir^[6].

The abundance of insects has been found to vary from one area to another in the water body. Some corixids were also found at the surface area (photic zone) in some months, particularly April and May of 2002. Insects belonging to the families Corixidae and Belostomatidae were the most abundant among all the available families of Hemiptera. In terms of prevalence, Belostomatidae was next to Corixidae. Belostomatidae may be abundant due to excessive cold for which these insects took refuge in the mud or elsewhere.

The numbers of Nepidae were more in November and December, 2001, as periphyton, while they were noted in

Table 1: Systematic list of the insects collected and identified with distribution in different water layers in Swamp

Order	Family	Genus	Water layer
Ephemeroptera	Baetidae	<i>Baetis</i> Leach	Bottom (Benthos)
	Caenidae	<i>Caenis</i> Stephens	''
Hemiptera	Ephemeridae	<i>Ephemer</i> Eaton	Surface
	Corixidae	<i>Corixa</i> Geoffroy	Surface
	Belostomatidae	<i>Belostoma</i> Latr	Bottom (Mud or elsewhere)
		<i>Nectocoris</i> Fab.	''
	Nepidae	<i>Ranatra</i> Fabr	Surface
	Notonectidae	<i>Anisops</i> Spin	Middle (Shallow on the littoral zone)
Gerridae	<i>Gerris</i> Fabr	Surface	
Diptera	Hydrometridae	<i>Hydrometra</i> Lamarck	Surface
	Culicidae	<i>Anopheles</i> Meigen	Surface and middle
		<i>Culex</i> Linnaeus	''
Coleoptera	Dytiscidae	<i>Laccophilus</i> Leach	Bottom (Benthos)
		<i>Agabus</i> Leach	''
	Carabidae	<i>Carabus</i> Sciodte	''
	Hydrophilidae	<i>Laccobius</i> Brocher	''
		<i>Helochare</i> Joy	''
		<i>Hydrobius</i> Miall	''

Table 2: Monthly variation of some major groups of insects in study area

Time 4 items	Nov' 01	Dec	Jan'02	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Coleopterans	++	++	++	-	-	-	-	-	+	-	+	+
Dipterans	-	-	-	+	+	+	-	-	+	+	-	-
Hemipterans	+	+	-	+	+	++	++	-	-	-	+	+
Ephemeropterans	-	-	-	-	++	++	++	+	-	-	-	-
Unidentified	+	+	-	+	-	-	-	+	-	-	-	+

- = Low population; + = High population; ++ = Very high population

Table 3: The average fish production of different swamps

Swamp No.	Area		Production			
	Total area (m ²)	Water area (m ²)	Total weight of fish (g)	Weight m ⁻² (g)	Weight m ⁻³ (g)	kg ⁻¹
1	306.70	215.71±49.96	9157	29.86	42.45	298.60
2	140.49	88.23±33.32	4640	33.03	52.59	330.30
3	185.96	159.00±27.05	5512	29.64	34.67	296.41
4	165.19	71.93±20.90	5185	31.38	72.08	313.80
Mean	199.59	133.72±57.55	6123.50	30.98	50.45	309.78

June, 2002 at the surface. Members of Notonectidae were found in shallow waters at the littoral zone.

Representatives of the order Coleoptera were more abundant in colder months, particularly in November and December, 2001 and January, 2002 with the highest numbers (Table 2). This may be explained by the fact that in colder months they seek shelter, food and attachment as periphyton in increasing numbers thus being represented in higher numbers in those locations. The coleopterans were available mostly as benthos.

Dipterans, specially *Anopheles* and *Culex* were also noticed in the present study. They occurred now and then and their numbers were also very small. These were found at surface waters.

The numbers of Ephemeropterans as benthos were very small. The maximum number was recorded in March, April and May, 2002 (Table 2). The occurrence of the larger number of individuals of this group of insects in May, may be attributed to their life history phenomena.

Rahman *et al.*^[1] obtained an average (per swamp) fish production of 382 kg ha⁻¹ 8 months. Alikunhi *et al.*^[7] reported a maximum fish production in India as 700-4900 kg ha⁻¹ year. In the present investigation the average fish production of the swamps was recorded as 309.78 kg ha⁻¹ year (Table 3). Fish production was higher where insect population was recorded lower. It may be explained by the fact that insects were used as food by fishes.

Some insects (Belostomatidae) are harmful for fish as they predate upon plankton and developmental stages of fish. However, insects are an important element as food for fish, which come from nature directly. Swamps with abundant insect population can be profitably utilized for fish production.

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