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● *RESEARCH ARTICLE* ●

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Aqatic plant and planktons as bioagent for mosquito control

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ABSTRACT

The present paper report is based on the survey of planktonic genera from a breeding ground of mosquito at Vidisha M. P. It was noticed that planktons population have a direct bearing on the proliferation of aquatic stages of mosquitoes. Some phytoplanktons as well as zooplanktons provided a good source of larval food material but blue green algae and algal bloom were quite detrimental to the mosquito larvae.

Key words : Planktons, Bioagent, Aquatic stages, Copepodes, Rotifers, Cladocerans

INTRODUCTION

India is facing resurgence of malaria because of the resistance developed in vectors. Mosquito nuisances and mosquito-born diseases are increasing day by day. The use of chemical insecticides not only developed resistance in the insect vectors but they do cause great hazards to human health .The use of chemical insecticides is now no more a concrete solution to suppress vector population. General disillusionment with chemical control method has led to the resurrection of biological control from the pre-DDT era and to it becoming prematurely regarded by some as the solution to control vector problem (Service,1981). Progress in biological control of vectors has been very slow but the situation has improved during the past 10 year (Burger *et al.*,1981).

Ideally the objectives of biological control are not to eradicate at low densities through the coexistence of natural enemies. But this is much easier to said than to done partly because it is very difficult to understand the population dynamics of mosquito habitats, with chemical control there is no necessity. There are so many complexities regarding biological control agents, for example, the role of Copepods such as cyclops in mosquito control is quite complex matter because Cyclops can prey on mosquito eggs and larvae and are intermediate host of *coelmomyces*. They appear to be beneficial but unfortunately they are predator of one very important another bioagent *R. culicivorax* .This emphasizes the need for ecological and theoretical studies before rushing into biological control programs.

MATERIALS AND METHODS

Monthly fluctuation in zooplankton:

This Includes protozoans, rotifers, copepods and cladocerans, as indicated in Table 1. Regarding protozoans, maximum number were seen in march 2009 and lesser members were seen in September, 2008. However, the total number of genera were two in almost all the months. The maximum and minimum number of Rotifers, were 396 and 185 during the months of July and September, 2008, respectively. The maximum number of genera were 7 continusly in the months of January, February and March, among Copepods, maximum number were 261 during February in 2001. Whereas the minimum number were found during May, 2009. The number of genera of Copepods were 3, regarding Cladocerans population, the maximum population density of 303 was observed in November and minimum 106 in September of the same year. The total genera observed were 4 as indicated in Table 1.

Table 2 shows the distribution of Zooplanktons in the same breeding ground during the next year period *i.e.* 2009-2010. Maximum number of protozoans were seen in the month February (135 org./litre) whereas the minimum 56 in December, 2009. The number of genera remained constant to 2 only. Among rotifers, maximum number of 411 org ./litre was observeb in July and minimum 181 in October. The number of genera were between 5-7,

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similarly, Copepod distribution was noticed to be maximum 311 in Ferbuary 2010 and minimum 85 in October 2009. Number of genera were 3. As regards the Cladocerans as indicated in the table, their maximum number of 277 org ./litre was reported in the month of April whereas minimum 82 org./litre in October. The number of grnera Varied from 2-4. In another breeding ground, the distribution during the first year period was shown in the Table 3.

This also showed the maximum and minimum peaks of protozoans, rotifers, copepods and cladocerans during different months with the distribution of genera present in the pond, The result have been given in detail in Table 3.

Table 4 shows the distribution of plankton population and genera in the same habitat but during 2009-2010 period. Here also, the four different species of protozoans, rotifers, copepods and cladocerans were recorded in different months from July, 2009 to June, 2010 period. The maximum number of protozoans were recorded in September. That of rotifers also in september. In copepods it was maximum in month of July, whereas in case of *cladocerns*, the maximum number was seen in the month of October. The monthly fluctuation have been shown in detail in Table 4.

Table 1 : Monthly fluctuation in zooplanktons population and genera (organism/1) in railway overbridge pond during July 2008 to June 2009

Zooplanktons	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
Protozoa											
Total specimen	86	92	63	86	97	88	106	141	120	92	74
Total genera	2	2	2	2	2	2	2	2	2	22	1
Rotifers											
Total specimen	396	385	185	281	311	341	385	365	311	286	348
Total genera	6	6	4	6	6	7	7	7	5	5	5
Copepods											
Total specimen	215	251	92	196	211	208	235	261	243	217	79
Total genera	3	3	2	3	3	3	3	3	3	3	2
Cladopcerans											
Total specimen	216	269	106	150	303	185	301	259	207	119	173
Total genera	4	4	2	3	4	4	4	4	4	3	4
Total Zooplankton	913	997	446	713	964	792	983	946	835	741	612

Table 2 : Monthly fluctuation in zooplanktons population and genera (organism/1) in railway overbridge pond during July 2009 to June 2010

Zooplanktons	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Protozoans												
Total specimen	97	74	78	63	76	56	69	133	95	99	86	103
Total genera	2	2	2	2	2	2	2	2	2	2	2	2
Rotifers												
Total specimen	411	361	248	181	263	227	248	392	356	348	313	347
Total genera	7	6	6	4	6	5	7	7	7	6	6	5
Copepods												
Total specimen	204	217	131	85	187	158	174	311	261	219	235	201
Total genera	3	3	3	3	3	3	3	3	3	3	3	3
Cladopcerans												
Total specimen	266	222	236	82	128	213	190	177	232	227	134	132
Total genera	4	4	4	2	3	4	4	4	4	4	4	4
Total Zooplankton	978	874	693	411	654	654	681	1013	947	893	768	782

Table 3 : Monthly fluctuation in zooplanktons population and genera (organism/1) in Indira Complex pond during July 2008 to June 2009

Zooplanktons	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Protozoans												
Total specimen	96	122	83	67	37	72	117	56	37	27	24	43
Total genera	2	2	2	2	2	2	2	2	2	2	2	2
Rotifers												
Total specimen	365	483	319	296	149	176	398	243	147	118	77	55
Total genera	5	5	5	5	5	4	5	5	5	5	3	3
Cladopcerans												
Total specimen	271	328	220	156	67	93	266	131	50	90	28	92
Total genera	5	5	5	5	4	4	4	5	3	4	3	4
Total Zooplankton	1012	1164	928	624	734	478	964	526	316	276	167	236

Table 4 : Monthly fluctuation in zooplanktons population and genera (organism/1) in Indira Complex pond during July 2009 to June 2010

Zooplanktons	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Protozoans												
Total specimen	160	211	258	93	86	61	23	133	83	16	14	47
Total genera	2	2	2	2	2	2	2	2	2	1	1	2
Rotifers												
Total specimen	416	586	614	371	292	185	211	385	413	62	48	82
Total genera	4	5	5	5	5	4	5	4	5	4	3	5
Copepods												
Total specimen	365	331	323	204	126	84	98	206	152	49	39	51
Total genera	3	3	3	3	3	2	3	3	3	2	2	3
Cladopcerans												
Total specimen	344	358	361	363	164	139	54	168	226	29	302	84
Total genera	5	5	5	5	5	4	5	5	4	2	5	3
Total Zooplankton	1285	1496	1583	1031	668	469	396	892	74	156	131	264

RESULTS AND DISCUSSION

From the results as mentioned in Table 1 and 3, it appears that the rotifes were most dominating having maximum 6 genera whereas copepods were represented by 3 genera while protozoans 2 genera. The survey carried out during July 2008-2009 have shown maximum 847 genera with 5 species of Rotifers during July and May months. The study shows protozoans, copepods and cladocerans other than rotifers. From the results it is quite clear that diffugia, cyclops, diatoms and daphnia were the most dominating zooplanktons, similar results have been observe by Lampert (1981), Lewis (1979) who claimed that phytoplanktons exerted direct control over the reproduction of harbivours zooplanktons.

From the results of the present study, it is quite clear that planktons in the breeding ground have a direct bearing on the aquatic stages of mosquitoes. There are certain indigestable planktons which proved to be detrimental to the mosquito population. On the other hands, Daphnia like zooplanktons provided a good food for mosquito larvae. This is with an agreement to the veiws expressed by Nelson (1979), Panicker *et al.* (1992) and Mulla and Wilson (1986) and Sarthi (2002).

In conclusion, it can be said that Phyto and Zooplanktons in the breeding ground of mosquitoes enhance the proliferation of aquatic stages of mosquitoes except few cases where they are detrimental to the larvae of mosquitoes.

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