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QUALITATIVE ESTIMATION OF COPEPODA COMMUNITIES OF FRESH WATER ECOSYSTEM IN WASHIM TOWN MAHARASHTRA, INDIA



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ABSTRACT

Planktonic communities are mostly important to identifying the quality of water bodies. There are two types of plankton that is Zooplankton and Phytoplankton. Zooplankton has four basic groups these are Rotifera, Cladocera, Ostracoda and Copepoda. This Research paper only focuses on Copepoda communities in Washim town. Copepods are abundant and are important links in marine food webs. They serve as major grazers of phytoplankton's as components of the microbial loops. Small copepods exhibit various reproductive and feeding strategies which help to

maximize population size, in order to counter heavy losses due to predation. During the study periods total ten genera and two species of Copepoda was observed from four sampling sites. Copepoda is a pollution indicator species for that research work is going on only on the Copepod rather than other Zooplanktons.

KEYWORDS :Copepoda, Qualitative Estimation.

INTRODUCTION:

Zooplankton (Greek zoo, animal, planktons, wandering) are myriads of diverse floating and drifting animals with limited power of locomotion, majority of them are microscopic, unicellular or multi cellular forms with size ranging from a few microns to a millimeter or more. In addition to size variations there are differences in morphological features and taxonomic position. The zooplanktons

play an important role to study the faunal bio-diversity of aquatic ecosystems. The word copepod come from the Greek words kope and pods referring to how their antennae and legs move like oars as the copepod is swimming copepod any of very many small crustaceans, of the subclass Copepoda, that are widely distributed and ecologically important, they include the water fleas. There are over 12000 copepod species although not all live in salt water Even though they are considered plankton copepods range in size from less than a millimeter to about a foot long. The zooplankton community is an important food resource for many fresh water fishes due to that it is essential to determine what kind zooplanktons were present in the aquatic ecosystems in the local water bodies of Washim town. The wide range of literature is available for the zooplankton study. Turner (2004) studied the importance of small planktonic copepods and their roles in pelagic marine food web. George (2005) studied the Sublittoral and bathyal Harpacticoida (Crustacea: Copepoda) of the Magellan region. Bhuiyan et al., (2008) studied the occurrence and abundance of some copepods in a fish pond in Rajshahi, Bangladesh in relation to the physico-chemical conditions. Deniz and Gonulio (2014) studied the temporal changes of copepod abundance and species composition in the coastal water of shamus in the southern Black sea.

MATERIALS AND METHODS:

Description of study Area:

Washim located in the eastern region of Vidhrbha and is one of them four municipal councils of Washim district of Maharashtra. Washim was known earlier as Vastagulama and it was the seat of power of the Vakataka Dynasty. Washim is also known as Basim, Arabic name that means the 'One that smile'. It is especially famous for its ancient Balaji Temple. In ancient city of Washim, there were four entrances the Mahur in the east, the kativesh in the west, and the chandikavesh in the south and the mangalvaries in the north. Out of which only the Mahur is in existence and counting its last days. Washim district was formed on 1 July 1998 which was formally a part of Akola district. Washim is the head-quarter of district. There are five minor rivers in the region these are Katepurna, the Adam ,the Chandrabhaga , the Watsara and the Puts. The region is occupied by valley of the river Godavari and Tapi.

Sampling Stations:- Four different perennial water bodies located in the Washim city were selected for the study.

METHODS OF COLLECTION:-

The zooplankton collection involved primarily the filtration of water by the net, collecting the water in bottles. The sample success will largely depends on the selection of a suitable gear; mesh size of a netting material, time of collection of water, depth of the study area and sampling strategy. The gear should be used keeping in view the objectives of the investigation. The most common method of zooplankton collection is by the net. The amount of water filtered is more and the gear is suitable both for qualitative and quantitative studies. The plankton nets used are of various types and sizes.

Sometimes combinations of the nets with the mesh of different sizes are used .There is a great variety of a mesh available from the finest to the coarse pore sizes. The mesh size of 0.2mm of monofilament nylon is usually is used for collecting the zooplankton for taxonomic and productivity studies. The necessity of proper fixation and preservation of zooplanktons need no of emphasis. The poorly fixed and preserved samples were rendering their subsequent analysis difficult. The whitish precipitate and ruptured exoskeleton can be seen in the improper fixation

The buffered formalin is mostly used as fixative and preservative. The other preservative used are 70% ethanol or 40% iso-propanol. Glycerin is often added to formalin to prevent shrinkage of the specimens, drying of the material and to facilitate the retaining colors of zooplanktons.

ANALYSIS OF THE SAMPLE

The basic analysis consists of the clearing. The fixed specimens must be cleared of any attached materials such as detritus or precipitate. This can be done by removing the extraneous substances with fine forceps or needles without damaging the specimen. The specimens are immersed in clearing fluids such as lactic acid, glycerin and propylene glycol. The lactic acid is commonly used as a clearing agent and care should be taken that specimens are not left in the lactic acid for a long period which would result in disintegration of the body tissue of zooplankton. Examination of the external features becomes easier after clearing the specimens.

RESULT AND DISCUSSION:

Copepods were most often represented by species from the genera Cyclops and mesocyclops. The presence of copepods indicates pollution. Water temperature and availability of food organisms affect the copepods population. The copepod forms the largest division of the crustacean comprising over 6000 species. They are minute often less than a millimeter in length. Majority are free swimming and abundant in fresh and marine habitat, constituting part of plankton and forming the food of fishes.

Copepods play an important role in lakes ecosystem and food chain. Unlike algae, or phytoplankton zooplankton are microscopic animals that do not produce their own food. They are responsible for eating millions of little algae that may otherwise grow to an out of control state. Copepods are also a valuable food source for the planktivorous fishes and other organisms as suspension feeders they feed mainly on phytoplanktons and protozoans but some species are predatory copepods can be strong swimmers and will also undergo diurnal migration. They are an important link which connects food webs between small algal cells, all the way up to large fish and even whales. The various species of copepods were recorded in water sample, such as the *mesocyclops*, *leuckarti*, *copepode Cyclops*, *calanus copepode*, *macrocyclops Diaptomus*, *Tropocyclops*, *Tropocyclops spe.*, *Orthocyclops* and *Eucyclops* This species discuss in Table No. I.

Table No. I: Record of Copepods in Washim region from four sampling sites.

Sr. No	Phylum	Class	Family	Genus	Species
1	Arthropoda	Crustacean	cyclopidae	<i>Mesocyclops</i>	<i>M.leukarti</i>
2.	Arthropoda		Cyclopidae	<i>cyclops</i>	
3.	Arthropoda	Arthropoda	Cyclopidae	<i>calanus</i>	
4.	Arthropoda	maxillopoda	Macrocylops	<i>Macrocylops</i>	<i>M. albidus</i>
5.	Arthropoda	maxillopoda	Diaptomidae	<i>Diaptomus</i>	
6.	Arthropoda	maxillopoda	Cyclopidae	<i>Microcyclops</i>	<i>M.varicans</i>
7.	Arthropoda	Crustacean	Cyclopidae	<i>Tropocyclops</i>	<i>T.prassinus</i> <i>Mexicans</i>
8.	Arthropoda	Crustacean	Cyclopidae	<i>Tropocyclops</i>	
9.	Arthropoda	maxillopoda	Cyclopidae	<i>Orthocyclops</i>	<i>O.modestus</i>
10	Arthropoda	maxillopoda	Cyclopidae	<i>Eucyclops</i>	<i>E.prionophorus</i>

Data obtained from the present investigation indicates the number of Zooplankton species recorded in the four sites viz., Fish farm of R.A. College, Deotalav, Padmatirthtalav and Ekburji Dam. The abundance of copepods among the zooplanktons and their special mode feeding has earned them an important place in the aquatic food chain. They graze directly on the primary sources or energy, namely the phytoplankton's, detritus, bacteria and in turn fall prey to the secondary consumers such as fishes. Thus their role in the economy of the aquatic ecosystem is mainly to convert plant into animal substances. Among the recorded copepods some species dominated in certain seasons while some disappeared in the other seasons indicating the different growing patterns of the species. *Cyclops*, *Diaptomus* showed positive correlation ship with pH, free CO₂ and bicarbonates, it was negatively correlated with temperature, dissolved oxygen (DO) and carbonates. *Mesocyclops* showed positive correlation ship with temperature, pH, CO₂, carbonates and bicarbonates. It was negatively correlated with dissolved oxygen (DO). More or less similar findings were observed by **Islam et al.**, (2000) in a fish pond of Rajshahi City. From the present study it was observed that copepods were very much abundant in the pond which was favorable for planktivorous fish culture. The following species are faired in the tropical water and are important as fish food organisms in Aqua-hatchery and fish nurseries.

During the study total 10 copepods were observed in the four water bodies, of which maximum copepods were observed in Fish farm followed by Ekburji Dam, Deotalav and Padmatirthtalav. In the Fish farm abundant Cyclops were observed and indentified. They are as *Mesocyclops*, *Calanus Cyclops*, *Copepod Cyclops*, *Macrocylops*, *Microcyclops*, *Tropocyclops*, *Eucyclops*, *Orthocyclops modestus* and many more. Similar study was carried out by Shah et al., (2013) in the Wular Lake, Kashmir Himalaya. The copepods observed and indentified in the Ekburji Dam are *Orthocyclops modestus*, *Tropocyclops prassinus mexicanus*, *Microcyclops vericans*, *Mesocyclops*, *Calanus Cyclop*, *Eucyclops*. Similar study was carried out by Scholl and Kiss (2008) in the water bodies of the *Gemenc Floodplains* (Duna-Drava National Park Hungary) and Sivakami et al., (2015). In Ekburji reservoir two species of *Copepoda* *Diaptomoid nauplius* and *Mesocyclops* sp.was recorded by Tandale et al., (2011)

The copepods observed and identified in the Deotalav are *Macrocylops*, *Microcylops*, *Tropocyclops prassinus mexicanus*, *Calanus Cyclops*, *Orthocyclops modestus* and similar study was carried out by Manjare (2015) in the water tanks of Kolhapur District, Maharashtra and Paturej et al., (2012).

The copepods observed and identified in the *Padmatirthtalav* are *Microcylops vericans*, *Mesocyclops*, *Calanus Cyclop.*, *Eucyclops* and the similar study were carried out by Bhuiyan et al., (2008).

CONCLUSION:

Copepods are abundant and are important links in marine food webs. They serve as major grazers of phytoplankton's as components of the microbial loops. Small copepods exhibit various reproductive and feeding strategies which help to maximize population size, in order to counter heavy losses due to predation. The presence or absence healthy zooplankton population can determine some commercial fisheries success in fresh water bodies. By insuring that the lower parts of the food chain are healthy, we can protect the higher ordered organisms like fish. Accordingly, small copepods can become extremely abundant and presumably exert substantial feeding impact on their prey, but such data are scarce. The qualitative analysis of zooplankton from all three aquatic ecosystems revealed of species followed by copepods in nauplius form copepodite. The qualitative analysis performed on fish farms pond zooplankton reveals low level of biodiversity in samples collected at the first part of at the vegetative season and also at the end of the season.

Also, to the end of the season the biological potentials of the pond mainly of the zooplankton it was significantly reduced.

It is recommended that fertilizers should also be applied to the earthen pond so as to increase the nutrients availability of the water in the pond as it was done in the concrete tank the natural food production.

ACKNOWLEDGEMENT:

I am thankful to Dr. D. S. Dabhade, Professor and Head P. G. and Research Departments of Zoology R. A. College Washim for their Valuable Guidance and provide the well equipped Laboratory facility.

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