CORRELATION OF CRUSTACEAN POPULATION WITH PHYSICO-CHEMICAL FACTORS FROM ASOLAMENDHA LAKE, DIST. CHANDRAPUR (M. S.), INDIA

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Abstract:

Asolamendha lake is huge lake situated at Chandrapur district; the north eastern part of Maharashtra state of India. This lake was studied for the 2 year from June 2010 to May 2012 for physicochemical parameter and Crustacean community structure. Collection was taken on monthly basis and both qualitative and quantitative analyses were made to investigate the abundance and distribution of Crustacean. In the present study crustaceans were correlated with the physicochemical parameter. Crustacean population was composed of total 11 species in which 7 species of Cladocera, 3 species of Copepoda and 1 species of Ostracoda were observed.

Keywords:

Asolamendha, Crustacean, Cladocera, Copepoda, Ostracoda.

Introduction:

Limnology is related with study of physical, chemical, biological and geological aspects of fresh, marine and brackish waters contained within the continental boundaries. Biodiversity of zooplankton shows a correlation of their occurrence with the physico chemical factors in the water bodies (Tijare and Thosar; 2010, Pradhan and Shaikh; 2011). Crustacean holds a central position in food chain of most the lakes , reservoirs and ponds and are highly sensitive to environmental variation which as a result bring changes in their abundance, species diversity or community composition ,because most species have short generation time (Pandit 1980; Sharma et al., 2008; Shah and Pandit 2013). Ponds directly or indirectly have an enormous ecological, commercial, and socio-economic importance. They are rich in component of biodiversity, like flora and founa of local, natural, and regional significance. Thus the ponds play an important role in biodiversity (Ghanai et al., 2010). The composition and diversity of crustacean provide information on the characteristics and quality of the water body (Okayi et al., 2001) Crustaceans have worldwide-distribution, establish across all habitats. They are important for evaluation of the impacts of climatic change and anthropogenic pressures on non-model systems (Buhay, 2011). Crustaceans are an important constituent of zooplankton and play fundamental role in aquatic food chains. Besides being an important food item of fishes, the animalcules also find use as potential indicators of the trophic status of a water body since their structure and composition are highly affected by eutrophication (Patalas, 1992). Therefore, this study was designed to assess crustacean community in terms of species composition and diversity between various sites, under the operative influence of varying physico- chemical environment of Asolamendha Lake

Material and Method:

The study was conducted between from June 2010 to May 2012. The water samples were analysed monthly for important physic-chemical properties (APHA 1998). The water samples were collected monthly in the early morning from all the three selected sampling sites (S1, S2 & S3). The water samples were collected in wide mounted screen capped, air tight and opaque plastic bottles. The physicochemical parameters were estimated with the help of titrometric and spectrophotometric method. Zooplankton sample was collected through 55 µm mesh size nylon plankton net. The collected zooplankton sample was preserved in 4% formalin and few drops of glycerine were added to it. Identification of Crustacean zooplankton was done under microscope using keys and monographs of Edmondson (1992) Pennak (1978) and Adoni (1985). The quantitative analysis of zooplankton was done by using Sedgwich rafter cell.

Result and Discussion:

The species composition and abundance of each zooplankton group varied from time to time and season and depended on limnological characteristic of the water body. Density, diversity and composition of zooplankton also show monthly variation. In the present study three groups have been incorporated, i.e. Ostracoda, Cladocera, and Copepoda. Among theses 7 species of cladocera, 3 species of copepod and 1 species from ostracoda were examined. The abundance and distribution of crustacean zooplankton is influenced by several ecological factors. The physicochemical parameters such as temperature, light, pH, organic, inorganic constituents and the interrelationship with the organism plays an important role in determining the nature and pattern of fluctuation of population density in an environmental unit. In the present study crustaceans were correlates with physicochemical parameter. From the group of Ostracoda only one species i.e. Cypris sp. was observed and it shows positive correlation with temperature and negatively correlation with the dissolved oxygen (Bahura,1997 & Paulose et.al. 2008). Cypris sp. was abundantly found in the summer season. It negatively correlates with the dissolve oxygen, and water transparency and positively correlates with the ambient temperature, water temperature, conductivity, total alkalinity and CO2 (Parveen et al., 2013).

Ostracoda are widely distributed in all types of aquatic environment and water temperature, D.O. and electric conductivity are the most effective factor influencing species composition of ostracoda (Dugel et al., 2008). Cladocera shows positive correlation with the water transparency (Parveen et al., 2008 and Heikal, 2005) while negatively correlates with the pH, Total alkalinity, total hardness (Paulose and Maheshwari, 2008). Maximum population of Chydorus sphaericus observed in winter season. It significantly Positive correlates with D.O. at $P < 0.05$ and insignificantly positive correlation with the transparency and negatively correlates with the ambient temperature, water temperature and pH at $P < 0.05$ and total hardness at $P < 0.01$, (Tiwari et al., 2011) The high transparency was the most valuable parameter that has affected the density of cladocera population, quantitatively as well as qualitatively. Therefore these factors usually govern the seasonal growth of and distribution of zooplankton communities in freshwater (Bais et al., 1993, Kumar et al., 2001). Moina macrura was found abundantly in the winter season. It shows significant positive correlation with the D.O. at ($P < 0.05$) and insignificant positive correlation with sulphate while negative correlation with the water temperature, Conductivity, total alkalinity , pH at ($P < 0.05$) and total hardness at ($P < 0.01$), and insignificantly correlates with phosphate and nitrate. Population of Cereodaphnia sp. was abundantly found in winter season. It show insignificant positive correlation with the water transparency, T.S., T.D.S., D.O., Suphate, phosphate, and Nitrate, and significant negative correlation with the Ambient temperature, , total hardness at ($P < 0.05$), and water temperature at ($P < 0.01$), and insignificantly correlates with pH, conductivity, alkalinity, CO_2. Maximum population of Bosmina longirostris was observed in winter. It shows significant positive correlation with the D.O.at ($P < 0.05$) and insignificant correlation with the transparency, sulphate, Nitrate, T.S. and T.D.S. and significant negative correlation with ambient, water temperature, total hardness at ($P < 0.05$) and insignificantly with conductivity, Total alkalinity, frees CO_2, pH and phosphate.. Alona intermedia was abundantly found in winter season. It significantly positively correlates with the D.O at ($P < 0.01$) and insignificantly positively correlates transparency, T.S., Sulphate and negatively correlates with the pH, conductivity at ($P < 0.05$) and ambient temperature , water temperature, total hardness and total alkalinityat ($P < 0.01$). Maximum population of Diphanosoma birgei observed during the winter season. It significant positively correlates with the transparency, at ($P < 0.05$) and D.O at ($P < 0.01$), and insignificant correlates with the Total solids, Sulphate. And negatively correlates with the conductivity at ($P < 0.05$) and ambient temperature, water temperature, total hardness, pH, at ($P < 0.01$) and insignificantly correlates with CO_2, phosphate, and nitrate. Pleuroxux denticulatus observed maximum during the winter season. It

Significantly positive correlates with the D.O. at ($P < 0.01$), and insignificant positive correlates with the transparency, T.S., T.D.S., sulphates, nitrates and negatively correlates with the pH at ($P < 0.05$), Ambient temperature, water temperature, total hardness at ($P < 0.01$), and insignificant correlates with , conductivity, Total alkalinity, CO2, phosphate. Copepods were showed positive correlation with the water transparency and Dissolve oxygen while negative correlation to various physicochemical parameter (Parveen et al., 2013). Maximum population of Heliodiaptomus viduus observed during the winter season. It insignificant positively correlates with the transparency, T.S., T.D.S, D.O, sulphate, nitrate. And negatively correlates with the water pH, temperature, total alkalinity, total hardness, phosphate. Maxima of Eucyclops sp. observed during the winter season. It positively correlates with the T.S. nitrates at ($P< 0.05$), sulphate at ($P < 0.01$) and negatively correlates with the ambient temperature, water temperature at ($P< 0.05$) and insignificant correlates with Transparency, total hardness, total alkalinity. Mesocyclope sp. was observed abundantly in the winter season. It positively correlates with the D.O. at ($P<0.01$) and insignificantly correlates with the transparency, sulphate and negatively correlates with the ambient temperature, water temperature, pH, Total hardness at ($P < 0.01$), and total alkalinity at ($P < 001$).

Conclusion:

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Table 1 : Correlation coefficient between various Physicochemical parameter and Crustacea of Asolamendha Lake, Dist.- Chandrapur, M.S. (India).

S.N.	Name of the species	Amb.Tem	Wat. Tem	pH	Cond.	Trans.	T. Alk.	T. Hrd.	Ca-Hrd.
1	*Cypris sp.*	0.62739*	0.63715*	0.73273**	0.54817*	-0.4477	0.41152	0.56355*	0.52773
2	*Chydorus sphaericus*	-0.6088*	-0.6593*	-0.6387*	-0.5216	0.37977	-0.3533	-0.6626**	-0.6146*
3	*Moina macrura*	-0.453	-0.5372*	-0.5885*	-0.6115*	0.53138	-0.4239	-0.6635**	-0.5974*
4	*Cereodaphnia sp.*	-0.6193*	-0.6962**	-0.4819	-0.2849	0.08849	-0.3112	-0.5589*	-0.5242
5	*B. longirostris*	-0.588*	-0.599*	-0.4701	-0.3692	0.33784	-0.1752	-0.5382*	-0.475
6	*Alona intermedia*	-0.6948**	-0.7499**	-0.6496*	-0.6116*	0.50615	-0.5039	-0.7961**	-0.7286**
7	*Diphanosoma birgei*	-0.77**	-0.7751**	-0.6983**	-0.5907*	0.55065*	-0.4188	-0.745**	-0.6679**
8	*Pleuroxux denticulatus*	-0.77**	-0.7998**	-0.6261*	-0.4534	0.39611	-0.3935	-0.6659**	-0.6021*
9	*Heliodiaptomus viduus*	-0.464	-0.4727	-0.5839*	-0.4448	0.28557	-0.2294	-0.4441	-0.4245
10	*Eucyclops sp.*	-0.6149*	-0.6205*	0.01737	0.15335	-0.2324	-0.0311	-0.3238	-0.2801
11	*Mesocyclope sp.*	-0.8461**	-0.8724**	-0.7583**	-0.6288*	0.52821	-0.5533*	-0.7943**	-0.7454**

S.N.	Name of the species	Mg-Hd	T.S.	T.D.S.	D.O.	CO_2	Sulphate	Phosphate	Nitrate
1	*Cypris sp.*	0.59282*	0.09543	0.15138	-0.5748*	0.48359	0.148	0.25563	0.17274
2	*Chydorus sphaericus*	-0.7089**	0.2917	0.14484	0.57646*	-0.0446	0.18545	-0.1598	0.09453
3	*Moina macrura*	-0.7469**	0.13401	-0.0776	0.60669*	-0.1162	0.05652	-0.3853	-0.1413
4	*Cereodaphnia sp.*	-0.5863*	0.41085	0.23605	0.45799	-0.0416	0.40088	0.08202	0.3371
5	*Bosminopsis longirostris*	-0.6254*	0.25046	0.1379	0.55581*	-0.1416	0.26729	-0.0571	0.10892
6	*Alona intermedia*	-0.872**	0.24059	-0.0141	0.73057**	-0.0805	0.19471	-0.3065	-0.0143
7	*Diphanosoma birgei*	-0.8447**	0.07796	-0.0576	0.72414**	-0.2505	0.07307	-0.2706	-0.0974
8	*Pleuroxux denticulatus*	-0.7444**	0.14728	0.03935	0.6838**	-0.364	0.1386	-0.1143	0.02849
9	*Heliodiaptomus viduus*	-0.4494	0.14086	0.06467	0.41605	-0.1595	0.03303	-0.1227	0.03491
10	*Eucyclops sp.*	-0.3878	0.58332*	0.49099	0.30051	0.09851	0.68626**	0.47115	0.59803*
11	*Mesocyclope sp.*	-0.8324**	-0.0043	-0.1574	0.79663**	-0.436	0.03249	-0.2934	-0.1279

Probability : P value for 12 month - 0.05 r = 0.532*

P value for 12 month - 0.01 r = 0.661**