International Journal of Advanced Biotechnology and Research ISSN 0976-2612,
Vol 2, Issue 2, June-2011, pp 286-290 **http://www.bipublication.com**

SEASONAL CHANGES IN THE OSTRACOD POPULATION IN RELATION TO THE PHYSICO – CHEMICAL CHANGES OF A PERENNIAL TANK IN WARANGAL DISTRICT, A.P.

Narasimha Ramulu . K, Benerjee. G, Srikanth. K, Ravindar. B, Gowri. P,

Fisheries Research Laboratory, Department of Zoology
Kakatiya University – 506 009.

ABSTRACT

Ostracods are small crustaceans which possess the bivalve carapase, enclosing the laterally compressed body. Ostracods constitute one of the important groups of zooplankton and are commonly known as "Seed shrimps". The diversity, abundance and seasonal fluctuations of Ostracods have direct link with water quality. They play an important role in transferring the energy from producers to the consumers and they occupy an intermediate position in aquatic food web. The present investigation was carried out from June 2007 to May 2008. The present paper deals with the seasonal occurrence of Ostracods in a major perennial tank located in Nagaram village of Warangal District. In the present investigation a total of five species of Ostracods such as *Cypris spp., Heterocypris spp., Hemicypris fossiculata, Llycypris gibba* and *Standansia elongata* were recorded. The study revealed the highest diversity of ostracods during summer and lowest during winter season. The role of water quality parameters such as Temparature, p^H, Transparency, Total Dissolved solids, Total solids, Conductivity, Dissolved oxygen, Free CO_2, Alkalinity, Chlorides, Total Hardness and Biological Oxygen demand with regard to the seasonal variations were recorded and reported. It is presumed that the seasonal variations in the Ostracod population will have tremendous impact on the productivity of the tank.

Keywords: Ostrocods, Food web, Water quality, Cypris spp, Diversity

INTRODUCTION

The Ostracods are very interesting crustaceans having bivalve carapace, constituting one of the important group of zooplanktons. They are commonly known as "Seed Shrimp" and play an important role in transferring the energy from producers to the consumers and they occupy the intermediate position in aquatic food web.

The abundance of zooplankton in a water body is regarded as an indicator of productivity. This is closely related to the quality of water. Keeping this in view, the present investigation was carried out in order to explore the seasonal occurrence of some Ostracods in relation to the physico-chemical parameters of Nagaram tank in Warangal district, A.P.

Several workers conducted their research on the percentage composition, seasonal variation and occurrence of freshwater zooplankton in different parts of India and in other countries[6, 7, 11, 12, 16, 23, 27, 29]. The fresh water ostracods occur in lakes, tanks, pools, swamps, streams and even polluted waters. Majority of them are free living and a few are commensals on the gills of Cray fishes and in the intestine of fishes and amphibians. Approximately 110 species are known from the inland water bodies of the Indian subcontinent Patil and Gouder [22].

The diversity of abundance and seasonal fluctuations of Ostrocods have direct link with water quality. A comparative study of seasonal variations of zooplankton communities (Ostracods) of Nagaram tank were made during June 2007 to May 2008. The zooplankton belonging to Ostracods in higher abundance was recorded during summer, while lower during winter season. This fluctuation of zooplankton (Ostracods) is mainly due to environmental changes (Suimez[9], Menzer et al.,[18], Sheeba and Ramanujan[25] and Sunkad[26]). In this paper an attempt has been made to assess the influence of some physico-chemical parameters on the species diversity, abundance and seasonal fluctuations.

MATERIALS AND METHODS

The water samples were collected every month from June 2007 to May 2008, and analysed as per the methods of APHA[4] and Kodarkar et al.,[17]. Physical parameters such as atmospheric and water temperature were measured using a Centigrade thermometer. Chemical parameters like CO_2, DO and alkalinity were assessed values were also recorded.

For the study of plankton, monthly samples were collected using plankton net made of bolting nylon cloth (mesh 25 □m) by sieving a known volume of water sample. The samples were fixed in 4% Formalin and preserved in 100 ml polythen bottles. For the identification of Ostracod species samples were examined in detail under the microscope with high magnification[5, 8, 10, 19, 20, 28].

For numerical estimation, the organisms were observed under light microscope using "Sedgwick Rafter Cell" method APHA[3]. Average of 5 to 10 counts for each sample was taken into account and result are expressed as number of organisms/lit.

RESULTS AND DISCUSSION

In an aquatic ecosystem zooplankton play a critical role not only for primary consumers but also they themselves serve as a source of food for higher organisms zooplankton provide the main food for fishes and can be used as indicators of the trophic status of water body Rao and Muley[24].

Table – 1 indicates some selected physico-chemical parameters of Nagaram tank water showing monthly mean values. Atmospheric temperature varied from 42.35^0C (May) to 29.52^0C (December). While water temperature varied from 17.75^0C (December) to 33.27^0C (May). The highest rainfall was recorded in September month as 323.6 mm and the lowest in May. However, December and January had no rainfall. P^H of the pond water was alkaline in nature with small variations (March 7.33 to July 8.05). The fact supports the view of Grossman and Benson[13] that in Ostracod can apparently regulate the hydrogen ion concentration in the area but after the death valves are destroyed quickly by the acid waters. The DO content of water varied from 2.03 mg/l (May) to 4.82 mg/l (January). The lowest free CO_2 was recorded as 5.67 mg/l and the highest value was 14.43 mg/l. According to these values the water quality Index exhibited high in summer and low in winter seasons.

S. No.	Parameters	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
1	Ambient Temperature	37.00	35.90	33.65	33.35	32.02	30.52	29.52	30.75	33.50	38.35	40.02	42.35
2	Water Temperature	27.52	26.22	25.90	25.62	19.40	18.27	17.75	21.05	25.52	26.65	30.30	33.27
3	P^H	8.00	8.05	7.73	7.87	7.96	8.05	7.60	7.50	7.75	7.33	7.74	8.00
4	Transparency	32.75	29.25	27.25	34.87	43.37	61.00	67.25	78.50	67.50	55.62	52.37	43.00
5	Total Dissolved Solid	455.25	452.00	463.25	441.75	331.00	315.25	307.25	294.75	286.00	268.75	271.00	270.25
6	Total Solids	709.75	762.75	785.75	782.00	677.75	654.50	689.25	597.00	572.00	556.50	590.25	624.75
7	Conductivity	0.35	0.34	0.29	0.26	0.23	0.23	0.21	0.18	0.21	0.25	0.28	0.31
8	Dissolved Oxygen	4.19	3.92	4.28	4.55	4.56	4.52	4.78	4.82	3.02	2.95	2.27	2.03
9	CO_2	6.63	8.60	12.73	11.71	14.43	12.97	5.67	7.40	7.75	6.475	7.66	6.97
10	Total Alkalinity	133.00	146.75	138.75	131.25	135.25	136.00	137.00	133.50	132.75	135.50	143.50	134.50
11	Chlorides	88.25	92.25	81.25	81.50	96.50	99.00	111.25	116.25	111.75	109.50	107.25	116.00
12	Total Hardness	247.00	235.50	227.75	201.50	189.50	162.75	117.50	113.75	167.00	200.50	188.00	201.50
13	B.O.D	6.91	7.58	8.36	8.85	9.40	11.35	8.57	7.43	7.72	7.33	7.05	5.26

Table – 1: Shows Average of Physico – chemical parameters (mg/l) of Nagaram Tank.

During summer the water level in the tank decreases and metabolic activities of biotic components increases significantly. As such metabolic activities of the biotic components and inlet of sewage in to the tank, the water pollution load increases. Alle et al., [2] and Harshey et al.,[14] has pointed out that lakes with hard water were more predictive per unit area than were those with the soft water.

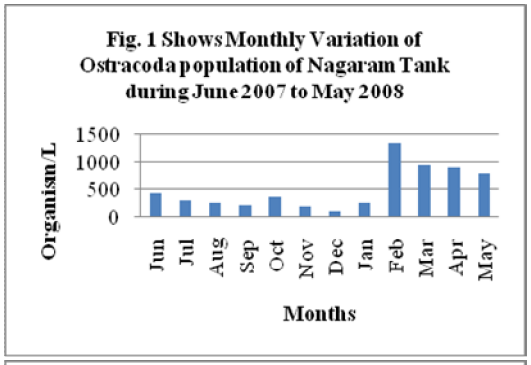
Table – 2: Shows Monthly variation of Ostracoda population of Nagaram Tank

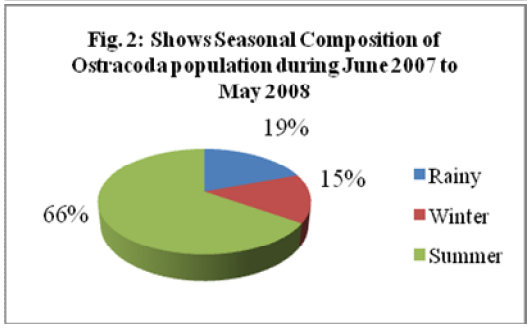
Sl. No.	Species	Rainy				Winter				Summer				Yearly mean
		Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Mean ± SD.
1	*Cypris Spp.*	-	-	58	90	40	60	-	80	180	65	250	152	**108.33 + 70.41**
2	*Hetero Cypris spp.*	50	40	20	36.6	-	-	98	110	250	82	160	210	**105.66 + 78.05**
3	*Hemi cypris fossuculata*	110	105	80	30	120	80	-	20	260	420	180	150	**141.36 + 114.32**
4	*Llyo Cypris gibba*	90	70	40	-	90	-	-	50	300	175	120	60	**110.55 + 82.02**
5	*Standensia elongata*	180	80	50	60	100	40	-	-	350	210	180	220	**147.00 + 98.77**
	Total	**430**	**295**	**248**	**216**	**350**	**180**	**98**	**260**	**1340**	**952**	**890**	**792**	**612.90 + 443.57**
	Average	**107.5**	**73.7**	**49.6**	**54.15**	**87.5**	**60**	**98**	**65**	**268**	**190.4**	**178**	**158.4**	

In the present investigation 5 species of Ostracoda were identified as *Cypris spp*. (Muller, 1776), *Heterocypris spp*. (Strauss, 1821), *Hemicypris fossuculata, Llyo cypris gibba* and *Standensia elongata* **[Table-2].** Further it was observed that abundance of Ostracods during summer was highest and lowest during winter **[Figure-2]**. Winsky et al.,[30] and Adolia and Vyas[1] also reported the summer population was maximum in their studies.

Among these fluctuations December month shown the lowest population and February month highest peak in the population of Ostracods **[Figure-1]**. Sunkad[26] and Manzer et al.,[18] also reported the seasonal fluctuation of Ostracodan abundance studied in the freshwater lentic ecosystem. Hujare[15] has reported absence of any

seasonal trend in Ostracods on the basis of their work. Pandit et al., [21] stated that poor number of Ostracods in Pravara river in Ahmedsagar, Maharashtra. During this study period the water quality parameters exhibited water is alkaline in nature. These observations indicate that, as water quality increases, population density of Ostracods also increases. The pollution load fluctuates in different seasons due to several factors such as the volume of water, density of biota, the quantity and quality of domestic sewage.





From the results of the present study, it may be revealed that members of the group Ostracods show positive relationship with nutrients like temperature, TDS, Chlorides while it negative relation with BOD. Its maxima during summer may be attributed to higher temperature, lesser dilution and concentration of nutrients as is also opined by Young[31]. Winter minima of Ostracod population may be due to low temperature and high input of pollutants during rainy season.

ACKNOLDGEMENT

The authors are thankful to the Head, Department of Zoology, Kakatiya University for providing necessary facilities to carry out the present work in fisheries research laboratory.

REFERENCES

1. **Adholia, U. N. and Vyas, A.[1993]:** Ostracod community in relation to limno-chemistry of Mansarovar reservoir, Bhopal. *J. Natcon* 5 – 2 - (1 - 12).
2. **Allee, W.C., Park O., Emerson, A.E., and Schmidt, K.P.,[1959]** *Principles of Animal Ecology.* W.B. Saunder's Company London. pp.837.
3. **APHA [1991]:** Standard methods for the examination of water and wastewater. American public Health Association. Inc. New York 18th Ed.
4. **APHA [2005]:** Standard methods for the examination of water and waste water. 21st Edn., Washington, D.C.
5. **Battish, S.K and Parminder Kumari [1986]:** Effect of physico-chemical factors on the seasonal abundance of Cladocera in typical pond at village of Ragba, Ludhiana, *Indian. Ecol.*, 13 (1), 146-151.
6. **Blancher, C. Eldon [1984]:** Zooplankton tropic relation ships in some north and central floroda lakes, *Hydrobiologia*, 109: 125-263.
7. **Das, S.M. and Srivastava, V.K. [1956]:** Some new observations on plankton from freshwater ponds and tanks of Lucknow.
8. **Delorme, L.D. [1965]:** Limnological Factors Controlling Ostracods, *M.Sc. Thesis*, Geology Dept. Univ. Sastichewan. 72 pp.
9. **Duran, Mustafa and Menderes Suicmez [2007]:** Utilization of both benthic micro invertebrates and physico-chemical parameters of evaluating, water quality of the stream cekerek (Tokat, Turkey). *J. Environ. Biol.*, 28, 231-236.
10. **Edmondson W.T. [1959]:** Freshwater biology. 2nd edn John, Wiley and Sons, New York, USA p. 1248.
11. **Ganapati, S.V. [1943]:** An ecological study of garden pond containing abundant zooplankton *proc. Indian Acad. Sci. (Botany)*. 17(2): 41-58
12. **Gannon, E. John and Stemberger, S. Richard [1978]:** Zooplankton (especially crustaceans and rotifers) as indicators of water quality. *Trans. Amer. Micros. Soc.*, 97 (1): 16-35.
13. **Grossman, S. and Benson, R.H. [1967]:** Ecology of Rhizopoda and Ostracods of Southern Pamlico sound region, North

Carolina, *Ecology*, University Kansas publication 44 pp 1-90.

14. **Harshey, D. K., Shrivastav,A. K., and Patil S., [1987]:** Studies on the ecology of fresh water Ostracoda part II pollution ecology in Balsagar tank, Jabalpur M.P. India. *J. Curr. Biosci.,* 4(4) pp.127-134.
15. **Hujare, M.S. [2005]:** Hydrobiological studies on some water reservoirs of Hatkanangale Tahsil (Maharashrta). Ph.D. Thesis. Shivaji University, Kolhapur.
16. **Hutchionson, G.E. [1967]:** A treatise on limnology, volume II, Introduction to lake biology and the limnoplankton Wiley, New York. 11,15 pp.
17. **Kodarkar, M.S., A.D. Diwan, N. Murugan, K.M. Kulkarni and Anuradha Ramesh [1998]:** Methodology for water analysis (Physico-chemical, biological and microbiological). I.A.A.B. Publ. Hyderabad.
18. **Manzer, M.B.H., M. Nehal, M. Rahamatullah and H. Bazmi [2005]:** A comparative study of population kinetics and seasonal fluctuaction of Zooplankton in two diverse ponds of north Bihar. *Nat. Environ. Pollu. Tech.* 4, 23-26.
19. **Michel R.G. [1973]:** Seasonal trends in physico-chemical factors and plankton of a freshwater fish and their role in fish culture. *Hydrobiologia*, 30, 144-160 pp.
20. **Needham, J.G. and Needham, R.P. [1972]:** *A guide to the study of freshwater biology*. Holden-day, INC Cali 94 (III), U.S.A.
21. **Pandit ,S. V., Vaidya, V. V. and Joshi, P. P.[2007]:** Studies on zooplankton diversity of Pravara river, near Sangamner city, Dist, Ahmedsagar, Maharashtra. *J.Aqua. Biol.,*Vol. 22(2), 33-38.
22. **Patil, C.S. and B. Y. M. Gouder [1989]:** Fresh water invertebrates of Dharwad, Prasaranga , Karnatak University, Dharwad.
23. **Prashanth, B. [1916].** The seasonal conditions governing the pond life in Punjab. *J. Asiat Soc. Bengal* N.S. XII: 141-145.
24. **Rao, M.B. and Muley, E.V. [1981]:** Seasonal and Species of Zooplankton organisms and their succession in two freshwater ponds at Waghuli poona, *proc. Symp. Ecol. Anim. Pool. Zool. Surv. India.,* 2, 63-64 pp.
25. **Sheeba, S. and N. Ramanujan [2005]** Qualitative and Quantitative study of zooplankton in Ithikkara river, Kerala. *Pollu. Res.,* 24, 119-122.
26. **Sunkad, B.N. [2004]:** Diversity of Zooplankton in Rakshakoppa reservoir of Belgam of north Karnataka, India. *Ind J. Environ Ecoplan.* 8, 399-404.
27. **Vandysh O.I. [2004]:** Zooplankton as an indicator of state of lake of ecosystems polluted with mining waste water in the Kolapeninsula. Russian, *J. Ecol.*, 35 (2), 110-116.
28. **Victor, R and C.H. Fernando, [1979]:** The freshwater Ostracopoda (Crustacea: Ostracoda) of India. *Records of the Zoological Survey of India*, 74 (2) 147-242 pp.
29. **Webber Mona, Myers, Elecia Edwards, Cambell C. and D Webber [2005]:** Phytoplankton and zooplankton as indicator of water quality in Discovery Bay Jamaica. *Hydrobiologia.* 545: 177-193.
30. **Winsky, V., Rahkola, Sorsa, M. Viljanen, M., [2006]:** Seasonal succession of zooplankton of lake Ladoga (New Russia), *Verh. Internat. Verein. Limnol*. 29, 1149-1152.
31. **Young, J. [1974]:** Seasonal changes in the abundance of micro crustacea in a small pond. *Hydrobiologia* 45: 373-389.