

## SUMMARY

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This study was conducted to: i) determine the monthly variation, population density and diversity of rotifers in Head Balloki; ii) culture *Brachionus calyciflorus* and *B. angularis* in the laboratory; iii) rear fry of *Cyprinus carpio* on rotifers and commercial diet.

Water samples, as well as samples for planktonic rotifers were collected from the three study areas of Head Balloki, about 65 km from Lahore. The water samples were taken every month from January to December 2006. The physico-chemical parameters of water such as flow of water (in canals only), water and atmospheric temperature, Dissolved Oxygen, pH, Conductivity, Total Hardness, Oxygen Saturation (%) were determined.

Analysis of Variance of the three study areas showed that DO ( $F=3.80$ ,  $p=0.033$ ), and conductivity ( $F=5.23$ ,  $p=0.011$ ) were statistically significant ( $\alpha=0.05$ ) while water temperature ( $F=0.06$ ,  $p=0.946$ ), pH ( $F=0.09$ ,  $p=0.919$ ) and total hardness ( $F=0.39$ ,  $p=0.682$ ) were non-significant..

Plankton samples were taken monthly from a depth of 15-25 cm, from all the sampling points in order to study the population dynamics (i.e., seasonal variations, diversity and density) of rotifers. For plankton analysis 40 litres of water was passed through a sieve of mesh size 341  $\mu\text{m}$ , collecting filtered water in a plastic tub and discarding the material deposited in the sieve. The water of the tub was filtered by another sieve of mesh size 55  $\mu\text{m}$ , the contents of the sieve were washed in a small plastic tub and preserved in 50 ml plastic bottles in 4-5% formalin.

Rotifers were counted in a Sedgewick-Rafter chamber or cell at 60-100 x magnification using an inverted OLYMPUS microscope. The rotifers were identified to species level. The body shape, morphological features and behaviour of the rotifers were observed for this purpose.

In the present study, 38 rotifer species belonging to 20 genera and 13 families were identified from the three study areas. 20 species were new records for Pakistan. The highest density and diversity was observed in summer and the lowest in autumn/winter. In the Study Area 3, all the species

were found but in Study area 1 and 2 only 11 and 14 species were present, respectively.

In the waters of Head Balloki, the rotifer community was dominated by three families (Brachionidae, Lecanidae and Trichocercidae), with the genera *Brachionus*, *Lecane* and *Trichocerca* being the most important.

The three study areas showed similar trends with respect to impact of water parameters on population density and diversity of rotifers. Rotifer density was positively correlated with water temperature, being the highest in summer and the lowest in autumn/winter. Conductivity also had positive correlation with rotifer density. However a negative correlation was observed with pH, DO, and total hardness. Rotifers of study area 1 and 2 (lotic habitats) showed a positive correlation with water flow but rotifer diversity was very low as compared to that found in study area 3 (a lentic habitat).

Culture stations of different capacities were devised in order to maintain algae and rotifer cultures in the laboratory. The culture stations allowed for control, nutrients, light and aeration for both algae and rotifers. Two culture stations consisting of 10 soda bottles (1/2 litre capacity) were made to culture *Brachionus calyciflorus* and *B. angularis*, both species were collected from Head Balloki. Separate setups were arranged for each rotifer species. Rotifers were fed on three different diets: i) a mixed culture of algae, ii) *Chlorella* and bread yeast and iii) bread yeast and vitamin B<sub>12</sub>. The experiment was continued for 15 days for *B. calyciflorus* and 25 days for *B. angularis*. Following inoculation, the density of rotifers was estimated daily by mixing the cultures and taking three samples of 1 ml from each bottle.

*B. calyciflorus* and *B. angularis* reared on mixed algae showed the best results while minimum population density and rate of population increase per day was observed with bread yeast and vitamin B<sub>12</sub>. There was positive correlation among the population densities (Ind/ml) as well as among the rate of population increase of both species in relation to three food types. However ANOVA showed that the population density was statistically significant and a non-significant difference was found in the rate of increase of population of both species on the three food types.

Young fry of *Cyprinus carpio*, about one day old, were obtained from Fisheries Research and Training Institute Mananwan, Fisheries Department,

Govt. of Punjab, Lahore, Pakistan. Fry were fed on three different diets: i) rotifers reared on mixed culture of algae, ii) rotifers reared on *Chlorella* only and iii) commercial diet Biokyowa-C 1000 (Kyowa Hakko Kogyo Co. Ltd., Tokyo, Japan; containing 55% protein, 10% fat, 4% fibers, 17% ash). The experiment was continued for 10 days. Daily, 10 fry were removed randomly from each aquarium to estimate their weights and lengths. Average increase in weight and length per day, condition factor and specific growth rate, were determined.

Fish fry reared on rotifers cultured on mixed algae showed better results, as far as their weights, lengths, specific growth rate (SGR) and condition factor were concerned. But fry reared on commercial diet had better survival rate than other two groups.

A positive correlation (Pearson) was observed among the weights and lengths of the fish fry reared on the three food types. Analysis of Variance for average weights of the fry showed a non-significant difference ( $p=0.608$ ) among the weights of fry reared on three food types. However analysis of variance for average lengths of fry expressed that lengths had significant difference at  $p=0.056$ .