REARING OF CARPS BY USING BIO-GAS PLANT SLURRY AND OTHER INGREDIENTS IN PONDS AND LARGE WATER BODY

A

THESIS

SUBMITTED IN ACCORDANCE WITH THE REQUIREMENT OF THE UNIVERSITY OF DHAKA IN FULFILLMENT FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (PH. D.) IN FISHERIES

SUBMITTED BY

MD. NURUL HUDA
REGISTRATION & SESSION
61/1998-1999, 62/2003-2004

DEPARTMENT OF FISHERIES
UNIVERSITY OF DHAKA
DHAKA, BANGLADESH

SEPTEMBER, 2004

I hereby declare that the entire work incorporated in this thesis has been carried out by Mr. Nurul Huda, B.Sc. Hons., M.Sc. in the Department of Fisheries, University of Dhaka, Bangladesh, under my guidance. I am forwarding his thesis entitled "**Rearing of Carps by using bio-gas plant slurry and other ingredients in ponds and large water body**" being submitted for the award of the Degree of Doctor of Philosophy of the University of Dhaka. I recommend that he has fulfilled all the requirements and that the contents of this thesis has not been used for the award of any previous degree. The thesis is suitable for submission.

M. Shafi 18/9/04

(Dr. M. Shafi)
Professor and Supervisor
Department of Fisheries
University of Dhaka
Dhaka

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ABSTRACT

Two years study programme was conducted from April, 998 - March 1999 and April, 1999 - March, 2000 aiming to establish a low cost feed for fish culture.

An integrated agro-based farm was selected in the district of Manikgonj, Bangladesh for the study area. Seven ponds and four feed samples were used during experimentation. Feed sample 1 made from bio-gas plant slurry, feed sample nos. 2, 3 made from slurry and mustard oil cake at the ratio of 60:40 and 70:30 respectively. Feed sample 4 was purchased from the local market (control feed sample). In the present investigation, observations were made on water quality, quantitative and qualitative study of plankton and benthos, planktonic bio-mass, bio-chemical efficacy of different formulated feeds and relative growth of selected carp varieties i.e. Silver carp (*Hypophthalmichthys molitrix*), Catla (*Catla catla*), Rui (*Labeo rohita*), Mrigal (*Cirrhinus mrigala*), Carpio (*Cyprinus carpio*).

There was no rainfall in December'98 in the first year and maximum rainfall was recorded in September'99 in the second year. The minimum sunshine was recorded in August'98 in the first year and maximum was in February'99 also in the first year. The minimum humidity was recorded in March, 2000 in the second year and maximum was also in September'99 in the second year. The minimum water depth was recorded in May'98 in the second year in pond no. 4 and maximum was recorded in pond no. 1 in September'99 in second year. The water transparency was minimum in January'99 in the first year in pond no. 6 and maximum in January, 2000 in the second year in pond no. 2. During two year of the study period, the air temperature ranged from 21.5°C to 33.4°C. The water temperature ranged from 22.5°C to 33.5°C. The p^H ranged from 6.3 to 8.4, carbon dioxide ranged from 5 mg/l to 13.2 mg/l, dissolved oxygen ranged from 6.5 mg/l to 12 mg/l, hardness ranged from 92 mg/l to 118 mg/l, alkalinity ranged from 50 ppm to 120 ppm. The value of different physico-chemical variables of water in investigated ponds were suitable for fish culture.

In both the study period by the application of feed sample 1 in pond nos. 1, 2 the phytoplankton abundance ranged from 11310 individuals/l to 40503 individuals/l. On the basis of population abundance the identified groups of phytoplanktons were

ranked as Chlorophyceae (64.33 %) >Cyanophyceae (43.84 %) > Bacillariophyceae (28.92 %) >Euglenophyceae (16.50 %). By the application of feed sample 2 in pond nos. 3, 4 the population abundance ranged from 5113 individuals/l to 73745 individuals/l, where the groups were ranked as Chlorophyceae (70.15 %) >Cyanophyceae (55.68 %) > Bacillariophyceae (29.98 %) >Euglenophyceae (19.15 %). By the application of feed sample 3 in pond nos. 5, 6 the population abundance ranged from 18232 individuals/l to 70380 individuals/l, where the groups were ranked as Chlorophyceae (62.74 %) >Cyanophyceae (39.64 %) > Bacillariophyceae (34.66 %) >Euglenophyceae (33.41 %). By the application of feed sample 4 in pond no. 7 the population abundance ranged from 21181 individuals/l to 67103 individuals/l, where the groups were ranked as Chlorophyceae (52.36 %) >Cyanophyceae (45.99 %) > Bacillariophyceae (32.26 %) >Euglenophyceae (28.66 %).

During the present study the zooplanktonic community in the ponds was represented by 11 genera of Rotifera, 5 genera of Cladocera, 2 genera of Copepoda and 2 genera of Ostracoda. In both the research period by applying feed sample 1 in pond nos. 1, 2 the zooplankton population abundance ranged from 7189 individuals/l to 11908 individuals/l. On the basis of population abundance the identified groups were ranked as Protozoan (38.39 %) > Rotifera (33.24 %) > Copepoda (27.54 %) > Cladocera (27.27 %) > Nauplius (24.07 %) > Ostracoda (17.54 %) > Others (1.06 %). By applying feed sample 2 in pond nos. 3, 4 the population abundance of zooplankton ranged from 9804 individuals/l to 24323 individuals/l. The identified groups were ranked as Rotifera (40.61 %) > Copepoda (35.22 %) > Protozoan (35.19 %) > Cladocera (22.62 %) > Nauplius (17.80 %) > Ostracoda (16.20 %) > Others (.86 %). By applying feed sample 3 in pond nos. 5, 6 the population abundance of zooplankton ranged from 8110 individuals/l to 21856 individuals/l. The identified groups were ranked as Rotifera (46.95 %) > Protozoan (39.46 %) > Copepoda (31.13 %) > Cladocera (27.27 %) > Nauplius (24.35 %) > Ostracoda (16.16 %) > Others (.08 %). By applying feed sample 4 in pond no. 7 the population abundance ranged from 10011 individuals/l to 23370 individuals/l. The identified groups were ranked as Rotifera (30.42 %) > Copepoda (34.65 %) > Protozoan (23.95 %) > Cladocera (21.28 %) > Ostracoda (18.60 %) > Nauplius (15.99 %) > Others (.78 %).

Among the different macrobenthic groups, Oligochaetes were represented by 8 genera, Chironomid by 5 genera, Mollusca by 4 genera. By applying feed samples 1 in pond nos. 1, 2 the population abundance of benthos ranged from 1804 individuals/m^2 to 3179 individuals/m^2. On the basis of population abundance the identified groups of benthos were ranked as Oligochaeta (68.58 %) > Chironomid (61.58 %) > Mollusca (17.21 %). By applying feed samples 2 in pond nos. 3, 4 the population abundance of benthos ranged from 1813 individuals/m^2 to 7561 individuals/m^2. The identified groups were ranked as Oligochaeta (70.96 %) > Chironomid (67.98 %) > Mollusca (19.10 %). By applying feed samples 3 in pond nos. 5, 6 the population abundance of benthos ranged from 1834 individuals/m^2 to 5833 individuals/m^2. The identified groups were ranked as Oligochaeta (67.23 %) > Chironomid (64.13 %) > Mollusca (19.01 %). By applying feed samples 4 in pond no. 7 the population abundance of benthos ranged from 2928 individuals/m^2 to 9008 individuals/m^2. The identified groups were ranked as Oligochaeta (71.78 %) > Chironomid (45.39 %) > Mollusca (15.68 %).

In the present findings the planktonic bio-mass was determined on both wet and dry weight basis in both the year. The constant dry weight of plankton ranged from 2.98 mg/l to 7.98 mg/l and wet weight of plankton ranged from 14.8 mg/l to 80.1 mg/l.

Four feed samples were considered and used during the study. The comparative proximate analysis i.e. ash, crude fibre, protein, fat, carbohydrate of the feeds was estimated. In the dry form, the moisture contents in all the four feed samples were zero. The ash contents in sample nos.1, 2, 3, 4 were 15.36%, 36.09%, 11.04%, 17.54% respectively. The crude fibre contents in samples nos. 1, 2, 3, 4 were 4.58%, 11.28%, 2%, 1.97% respectively. The protein contents in sample nos. 1, 2, 3, 4 were 30.40%, 10.15%, 21.17%, 9.73% respectively. The fat conten in sample nos. 1, 2, 3, 4 was 6.87%, 1.84%, 16.50%, 4.35% respectively. The carbohydrat contents in sample nos. 1, 2, 3, 4 were 42.27%, 40.44%, 51.32%, 68.16% respectively. The caloric contents of sample nos. 1, 2, 3, 4 were 350 k/cal, 218 k/cal, 420 k/cal and 347 k/cal respectively.

In addition, estimation of minerals i.e. Ca^+, Mg^+, Na^+, K, Iron, Zinc and Copper of each feed was done. By appling feed sample-1 the amount of Ca^+, Mg^+,

Zn^+, Fe^+, Cu^+, were 718 mg/100g, 672 mg/100g, 11.64 mg/100g, 21.68 mg/100g, 2.04 mg/100g respectively. In feed sample-2 the Ca^+, Mg^+, Zn^+, Fe^+, Cu^+ were 323 mg/100g, 296 mg/100g, 5.72 mg/100g, 8.57 mg/100g, 1.08 mg/100g respectively. In the feed sample-3 the Ca^+, Mg^+, Zn^+, Fe^+, Cu^+ were 307 mg/100g, 253 mg/100g, 5.37 mg/100g, 9.92 mg/100g respectively. In feed sample-4 Ca^+, Mg^+, Zn^+, Fe^+, Cu^+ were 492 mg/100g, 417 mg/100g, 2.97 mg/100g, 14.82 mg/100g, .85 mg/100g respectively.

The considered fish species in the present investigation were Silver carp, Catla, Rui, Mrigal and Carpio. The Silver Carp and Catla as surface feeder fish. The surface fish population was adjusted in the first year at the ratio of 50% basis and in the second year at the ratio of 80% and 20% basis. Rui as column feeder fish. Mrigal and Carpio as the bottom feeder fish. The bottom fish population was adjusted in the first year at 50% basis and in second year at 30% and 70% basis. The ratio between surface, column and bottom feeder fish in the first year was 4:2:4 and in second year was 3:2:5. During the study the column feeder fish species remained static but there was a change in the surface and bottom feeder fish population in both the years. The cause of fluctuation in the ratio of surface and bottom fish population was due to first growing exotic fishes for which there was market demand by the middle class buyers.

In case of Silver carp the average initial body weights in pond nos. 1, 2, 3, 4, 5, 6 and 7 were 6.5 g, 5.5 g, 7.5 g, 7 g, 6.5 g, 7 g, 9 g respectively and maximum body weights were 179 g, 188g, 612.5g, 644.5 g, 799 g, 834 g, 916.5 g per year respectively. In case of Catla the initial body weights in pond nos. 1, 2, 3, 4, 5, 6 and 7 were 5.5 g, 5.5 g, 6 g, 6.5 g, 6 g, 6.5 g, 6.5 g respectively and the maximum body weights were 85 g, 86.5 g, 306 g, 326.5 g, 328 g, 314 g, 375 g per year respectively. In case of Rui the initial body weights in pond nos. 1, 2, 3, 4, 5, 6 and 7 were 3.5 g, 3.5 g, 6.5 g, 5.5 g, 7 g, 6.5 g, 6.5 g respectively and the maximum body weights were 84 g, 81 g, 224 g, 236 g, 279.5 g, 285.5 g, 336.5 g per year respectively. In case of Mrigal the initial body weights in pond nos. 1, 2, 3, 4, 5, 6 and 7 were 4.5 g, 3.5 g, 6.5 g, 6.5 g, 6.5 g, 6.5 g, 6.5 g respectively and the maximum body weights were 128.5 g, 110 g, 374.5 g, 368.5 g, 396.5 g, 396.5 g, 400 g per year respectively. Incase of Carpio the initial body weights in pond nos. 1, 2, 3, 4, 5, 6 and 7 were 6.5 g, 6.5 g, 5.5 g, 5.5 g, 6 g, 6.5 g, 6.5 g respectively, and maximum weights were 178 g, 177 g, 475 g, 489 g, 515 g, 507 g, 674 g per year respectively.

During the present investigation in both the years by applying feed sample 1 in pond nos. 1, 2 the fish production ranged from 1601 kg/ha/yr to 1668 kg/ha/yr. The feed cost was Tk .25 per kg. When feed sample 2 was applied in pond nos. 3, 4 the fish production ranged from 5050 kg/ha/yr to 5208 kg/ha/yr. Where the feed cost was Tk. 3.55 per kg. By applying feed sample 3 in pond nos. 5, 6 the fish production ranged from 5813 kg/ha/yr to 6147 kg/ha/yr, where the feed cost was Tk. 2.72 per kg. By applying feed sample 4 in pond no. 7 the fish production ranged from 6630 kg/ha/yr to 6710 kg/ha/yr, where the feed cost was Tk. 10.50 per kg.

It may be noted that the high rate of production of fish in control pond (pond 7) was due to application of commercial costly feed (feed sample 4). In pond nos. 5, 6 where feed sample 3 containing slurry and mustard oil cake was applied. The fish production was comparatively higher. By considering feed cost and locally available feed ingredients, the performance of feed sample 3 seemed to be more cost-effective and more affordable.

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1. GENERAL INTRODUCTION

Fisheries sector plays an important role in the economy of Bangladesh. The contribution of fisheries to our economy is substantial with reference to food consumption, nutrition, employment and export. The biological resource of Bangladesh fisheries is also rich. Inland fresh waters are inhabited by over 200 species of finned fish (Karim 1978, Agnero 1989). Shafi and Quddus (1982) have indentified 148 species of fishes from the freshwater of Bangladesh. Rahman (1989) has listed 260 species of freshwater fishes from Bangladesh, which also include many marine fishes, such as pomfrets, eel, catfish, wolf herring, flatfishes, Moray, Bombay ducks, Sagar Koi, Ribbon fishes etc. Recently Bernaseck *et al.*, (1972) has listed 137 speices of fresh water fishes from north-east region of Bangladesh. In addition to the rich fishery resources of indigenous origin about 15 exotic culture fin-fish species (Ali 1991) have been introduced in the country. So there is a great opportunity for culturing commercially, fast growing freshwater fish species in these water bodies.

Bangladesh has a vast water resource in the form of rivers, canals, beels, flood plains, coastal waters etc. There is about 43,39,694 ha of inland, 1,66,07,000 ha of marine water in Bangladesh (DOF 1998). Among the inland water 40,31,563 ha are of river, 1,14,161 ha of beel, 68,800 ha lake and 28,32,792 ha tidal area (DOF 1998). The total area of closed water is 2,92,378 ha haors and 1,40,000 ha are coastal shrimp farms (DOF 1998). Along the shoreline of the sea, 200 nautical miles long economic zone are included with the marine water.

The total fish production including capture and culture fishery was 0.773 million mt in 1984-85 and 1.37 million mt 1997-98. Major part of the production comes from inland water (75.76% in 1984-85 and 75.46% in 1997-98). The contribution of marine fishes (24.23% in 1984-85 and 24.54% in 1997-98) is not significant in comparison with inland water fish production. Among the total fish production, the major carp is prominant, for example during 1987-88 among the total inland water catch it was 4,66,697 mt. Highest contribution was from major carps (88,355 mt, 18.93% of the total catch). While both inland and marine water was considered, the contribution of major carp was also remarkable (10.68% of the total catch).

The average fish production in ponds in Bangladesh (2550 kg/ha/yr, DOF 2002) is low, compared to neighbouring countries against an average of 3200 kg/ha/yr in China (Wohlfarth and Hulata. 1987), 2000 kg/ha/yr under extensive and 5000-7000 kg/ha/yr under semi-intensive in India (Tripathi 1988). Although fish rearing in ponds is an age-old practice in Bangladesh, modern fish culture technology is relatively unknown to the pond culturist and that is probably one of the principal reasons for low level of fish production in ponds.

The increase of fish production in any water body entirely depends upon the proper management of fishery resources. The most important aspect of fishery management, is the knowledge of natural history of fishes, their breeding and food feeding habits with adequate knowledge of nutrition of fish foods, its production biology.

Fish is the second staple food after rice in Bangladesh. About 73% of animal proteins in our diet come from fish alone (Rubbi *et al.* 1978). Fish protein is about 85-90% digestable and contains necessary dietary amino acid and poly-unsaturated fatty acid (Nelson 1972). Unfortunately, the per capita fish consumption has dropped from 33 g/day in 1963-64 to 20.5 g/day in 1993-94, against the recommended level of 38 g/day (FFYP 1990-1995). In the back drop of this dietary deficiency and rapid population growth, the open water fish production dropped down to 50% (Ali 1995). It is generally held that capture fishery has been over exploited and the resources are under tremendous pressure.

There are more than 1.3 million ponds in Bangladesh and 50% of them, have been brought under culture practice (DOF 1985). In fact pond culture has potential for expansion and represents a major potential for increasing fish production in the country. Fish production from pond culture has increased from 1,50,000 mt in 1987-88 to 3,10,130 mt in 1995-96 (Wahab 1996).

It has been proved that an unit area of water has higher carrying capacity than an unit area of land with whatever effort is put into it. Fish probably are the most efficient converter of feed to flesh requiring from 2-4 kg of basic feed stuff to produce 1 kg of fish (Ahmed *et al.* 1989).

The growing demand for fish led to the understanding of maximum fish production from minimum land. This led to the introduction of improved culture technique. The manurial practice in fresh water aquaculture comprises mainly of application of cowdung and other organic materials. As much of cowdung accumulation at the pond bottom without complete mineralisation even to the extent of 33% of input (Ram *et al.*1982, Wohlfarth & Hulata 1987). Bio-gas slurry is imerging as a manurial resource from over a million plants in the country. (Rai 1981; Kalyani and Shelly 1987; Tripathi *et al.* 1989). Tripathi (1991) has observed that though there is no increase in absolute concentration of nitrogen from cowdung to the slurry, the anaerobic decomposition and fermentation process in the bio-gas plant cause a relation increase in the volatile amoniacal form. The process aslo render the organic matter more easily degradable with increased phosphorus availability and reduce the in-pond oxygen demand for its stabilization (Chawla 1986). Tripathi (1991) has presented preliminary studies on the use of bio-gas slurry in aquaculture with reference to chemical and microbiological parameter. Dry matter contents of cowdung and the slurry have been analysed for comparison. Markanday and Saran (1991) have carried out recycling of cattle shed waste in aquaculture as the high cost of inputs in modern composite fish culture has been one of the major constraints in the adoption by pond culturist. Their aim was how to reduce the cost of supplementary feed and inorganic fertilizer by recycling the organic wastes both from plant and animal origin. In the recent days to enhance the pond productivity, the use of organic manure, i.e. bio-gas plant slurry, instead of inorganic fertilizer in addition to supplementary feed, which is made from organic materials is becoming popular day by day. However, still the production rate is low.

Investigation was carried out on the use of bio-gas plant slurry in ponds as supplementary feed and is considered favourably (Ameen *et al.* 1986). In many countries it gave encouraging results. Sludge is used as pond fertilizer in many countries. In India, Gopalakrishnan and Srinath (1963) used activated sludge as manure in fish pond. They observed the growth of *Cyprinus carpio, Cirrhinus mrigala* and *Catla catla* for a particular period and found that their growth responded positively to different doses of activated sludge. In Punjab, Kamaldeep Kaur *et al.* (1986) worked on survival and growth of *Cyprinus carpio* by using bio-gas slurry as feed in pond. They found that the growth rate of that species was 3.5 times higher than the natural production. In Tamilnadu, India, Pandian *et al.* (1990) worked on the culture of natural food of fish that is *Tubifex* and *Daphnia* to over come the excessive expenditure of feed cost. They used cowdung, poultry manure as a raw materials for mass culture of those living organisms and they got the encouraging result. Tripathi *et al.* (1991) evaluated manurial application levels of bio-gas slurry in carp farming. In Nigeria, Onuoha *et al.* (1991) worked on the effect of organic fertilizer in pond productivity and water quality of fish ponds. They found encouraging results. In Kowloon (Hong Kong), feasibility studies were done by Yang *et al.* (1993) on the use of sewage sludge as supplementary feed for rearing *Tilapia*, they got good growth of the fish with plankton production. In Bangladesh the use of bio-gas slurry in fish culture is a new approach. This has become a practice in one big integrated fish farm at Manikgong. The fish yield from the bio-gas slurry treated pond estimated to be more than 10 mt/ha (Anonymons 1992). Researches are carried out at the farm to assess the performance on the role of this slurry on the pond productivity and efficiency. Grameen Fish and Livestock Foundation has been using slurry from the biodigesters profitably in fish culture in ponds in Joyshagor Fish Farms in Sirajong and in other districts all over Bangladesh. According to their observation slurry can be used both as organic fertilizer as well as feed in carp culture ponds (Shafi, Personal communication). It is reported that slurry is also used in pond culture by the farmers in Gouripur and Iswargonj in Bangladesh.

For increasing the maximum fish production at low cost, pond aquaculture is very important for Bangladesh. It is also apparent that organic feed can increase the pond productivity.

Microscopic benthic fauna of Doughlas lake, Michigan have been studied by Moore (1939). Krishnamurthy (1966) studied the bottom macrofauna of the Tungabhadra reservoir. Michael (1966) observed the diurnal variations in physico-chemical factors and zooplankton in the surface layers of three fresh water fish ponds. Sehgal (1967) studied the fresh water Copepoda. Mickael *et al.* (1968) studied the zooplankton of a tropical fish pond. Das *et al.* (1974) studied the limnoplankton of some inland water of Dhaka city. The seasonal changes of plankton have been studied by Bhuiyan (1974). Islam *et al.* (1975) observed the limnological studies of the Ramna Lake at Dhaka. Saha *et al.* (1975) observed urea for enhancing the production of zooplankton in fish ponds. Mondal *et al.* (1975) studied the bottom fauna of a fresh water fish pond. Raman *et al.* (1975) observed the ecology of fish ponds with special reference to bottom fauna. Abraham *et al.* (1979) observed the bottom macrofauna of Bhavanisagar reservoir (Tamilnadu). to the conect Sugunan (1980) stated the seasonal flucatuations of plankton of Nagarjunasagar reservior of India. Ali *et al.* (1981) studied the benthic macro invetebrate production. Das *et al.* (1981) studied the biodynamics of the bottom macro fauna of an artificial pond. Miah *et al.* (1983) worked on the ecology of two ponds in Bangladesh. Miah *et al.* (1985) observed phytoplankton of pond soils of Bangladesh Agricultural University campus, Mymensingh. The planktons of some selected ponds in different location of Bangladesh have been studied by Banu *et al.* (1987). Begum *et al.* (1987) studied the plankton abundance in relation to physico chemical variables in two ponds in Maijdee Court, Noakhali. Chowdhury *et al.* (1989) have examined the variations of zooplankton in a fish pond in relation to some physico chemical factors. Ali *et al.* (1991) worked on fresh water invertebrates of Bangladesh. Anonymous (1992) observed the micro-benthic fauna of entegrated fish cum chicken farming pond. Latif *et al.* (1997) stated the zonal variation and abundance of benthic macro invertebrate in relation to some physico-chemical variables in the pond at fish cum chicken firm.

Mandal (?) studied the Chemistry of pond soils in relation to productivity of fish ponds. Prasad (1969) investigated the zooplankton bio-mass in the Arabian sea and the Bay of Bengal with a discussion on the fisheries of the region. Srivastava *et al.* (1979) observed the volumetric estimation of plankton bio-mass in relation to certain hydrological condition of Govindgarh lake, India. Kravolsov *et al.* (1984) worked on planktonic bio-mass. Kotani *et al.* (1991) studied the variations of zooplankton bio-mass. Anonymous (1995) observed the bio-mass of plankton in a pond of Chittagong University campus.

Banerjee (1967) studied the water quality and soil condition of fish pond in some states of India in relation to fish production. Standard methods for the examination of water and waste waters have been determined by APHA (1975). Khalaf *et al.* (1975) observed the physico-chemical condition in temporary ponds in the new forest, India. Boyd (1982) observed the water quality management for pond fish culture. Ameen *et al.* (1986) worked on comparative limnological study of two ponds in Raipur, Noakhali. BAFRU (1990) worked on water quality management for aquaculture and fisheries in Bangladesh. Khan *et al.* (1990) stated that the seasonal variation in physico-chemical condition of Dhanmondi Lake water.

Clement *et al.* (1967) observed the amino acid composition and nutrition value of the alga Spirulina. Liener *et al.* (1980) investigated the toxic constituents of plant feed stuffs. Sinha *et al.* (1980) observed the efficacy of a commercial fish feed for composite fish culture. Ali *et al.* (1981) observed the food of *Labeo rohita, Catla catla, Cirrhinus mrigala* in a pond of Bangladesh Agriculture University fish firm. Mazid *et al.* (1987) investigated the nutrition requirement of major carp. Kings *et al.* (1992) worked on nutrition for developing countries. Akter *et al.* (1992) worked on the growth of *Catla* fingerlings fed iso-caloric diets with variable protein levels in Bangladesh. Rathore *et al.* (1993) observed protein, lipid and carbohydrate contents of three micro algae. Krause *et al.* (1998) studied the food nutrition and diet therapy.

Sukumaran *et al.* (1968) observed the compatibility and competition between Silver carp and Catla. Rabanel (1968) worked on stock manipulation and other bioligical methods of increasing production of fish through pond fish culture in Asia and the far east. Banerjee *et al.* (1969) observed the use of poultry manure as fertilizer in rearing major carp. Alikunhi *et al.* (1971) worked on composite fish culture. Composite fish culture with exotic carps in India was studied by Chakraborty (1972), Sinha (1972), Singh *et al.* (1972) and Sinha *et al.* (1973). Saigal (1973) observed the domestic sewage in aid of fish culture. Chaudhuri *et al.* (1974) reported the record fish production with intensive culture of Indian and exotic carps. Chaudhuri *et al.* (1975) reported a new light in fish production in India with record yields by composite fish culture in fresh water ponds. Chakrabarty *et al.* (1975) worked on supplementary feed for enhancing fish production in freash water ponds. Chawdhury *et al.* (1975) worked on fish production in India with record yields by composite fish culture in fresh water ponds. Saha *et al.* (1978) studied the fish production in fresh water ponds by the use of fertilizer. Banerjee *et al.* (1978) studied the utilization of human and cattle urine in increasing fisn production. Murty *et al.* (1978) observed the fish porduction in compsite fish culture by nitrogenous fertilization with and without supplementary feeding. Chaudhuri *et al.* (1978) observed record fish production through intensive fish culture in a farmer's pond.

Kanaujia (1978) studied acceptance of artificial feed by cultivated carps in composite fish culture. Banerjee *et al.* (1979) worked on poultry droppings and its manurial potentiality in aquaculture. Saha (1979) worked on pond fertilizer. Ghosh *et al.* (1979) observed the domestic sewage in fish culture. Anonymous (1980) observed the pond fish culture in India. Michael *et al.* (1980) studied the food habits and growth of Silver carp and Big head carp in cages and ponds. Miah *et al.* (1981) worked on the growth rate of major carps in relation to physico-chemical and biological factors. Sharma (1981) stated the fish culture, integrated with livestock raising. Mustafa (1984) observed the limnology of a village fish pond with semi-intensive fish culture and annual fish production assessment from polyculture in it. Ahmed *et al.* (1989) observed polyculture of cultivated fish species for optimizing production from ponds. Wahab *et al.* (1991) studied the effect of Silver carp introduction in the polyculture of major Indian carp.

There is no doubt that organic manures increase the fish production in a pond. However, scientific investigation is required to establish the use of slurry as well as for the effective management of the pond. Besides, in the present studies, water quality, fish relative growth, feed efficacy, qualitative and quantitative study of plankton and benthos are also investigated, which provide a comprehensive picture of the present research work with the following objectives:

- To record the qualitative study of plankton and benthos;
- To record the quantitative study of plankton and benthos;
- To estimate plankton bio-mass production;
- To observe physico-chemical limnology of pond water;
- To investigate growth and production of major carps;
- To investigate the feed efficacy that made from bio- gas plant slurry;
- To introduce the aquaculture with a low cost feed and
- To achieve maximum fish production at minimum cost.

Fig. 1 : Location Map of the study area in Manikgong district

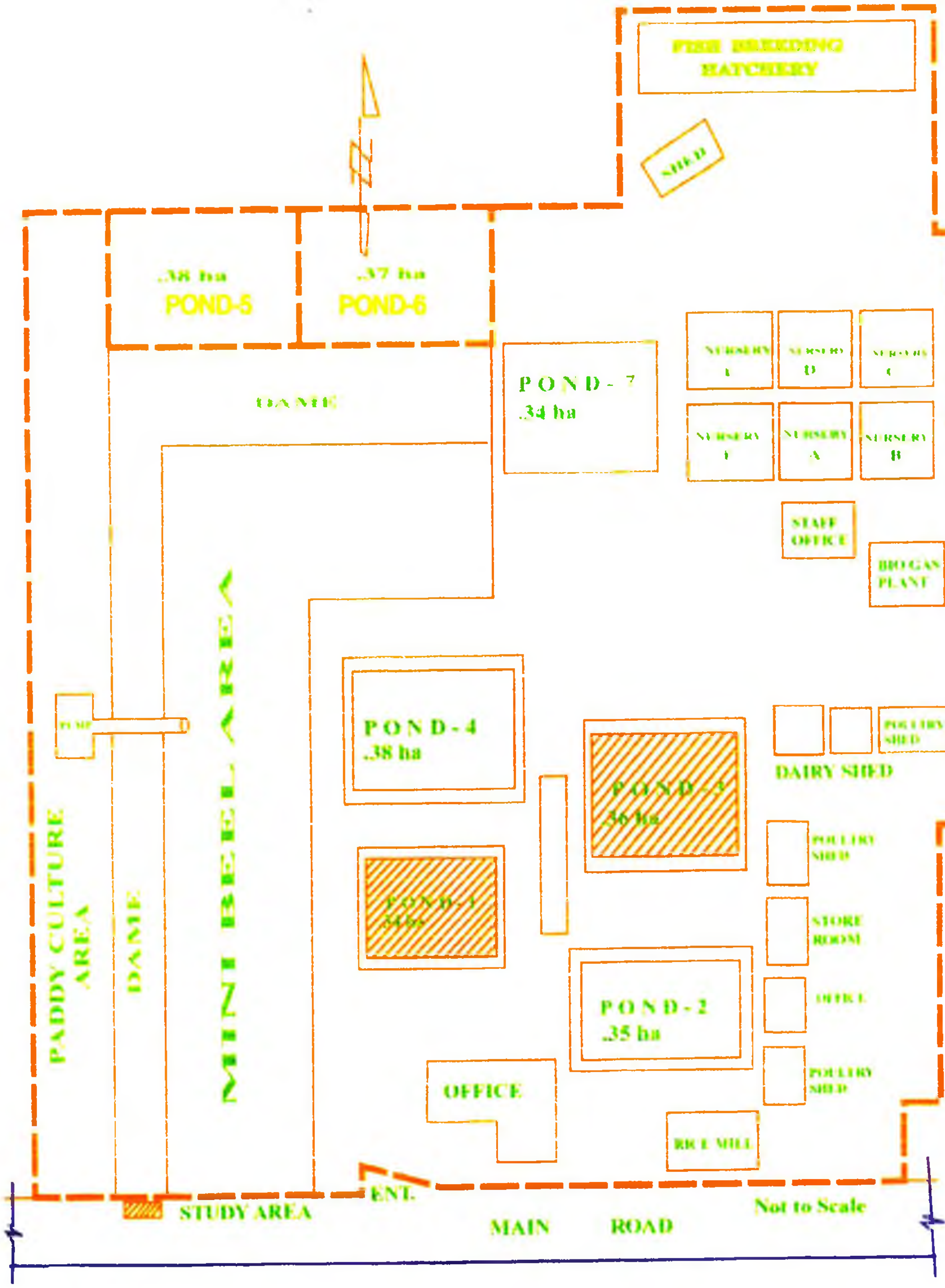


Fig. 2 The layout plan of Jahan-e-Nizam Multipurpose farm of Gheor Thana, District- Manikgong.

2.0 MATERIALS AND METHODS

2.1. Study area and period

Seven ponds were selected for the present study. It was carried out at the pond facility of JAHAN-E-NIZAM BOHUMUKHI KRISHI KHAMAR, located at village-Sribari, under Gheor thana of Manikgong district, in the north-western side about 75 km from Dhaka city and about 26 km north-west from Manikgong, district head-quarter. The location of the farm is in the Fig. 1.

However, most of the analytical works was carried out at the laboratory facilities of the Department of Zoology, Department of fisheries and Institute of Food and Nutrition Science, University of Dhaka.

Two years research programme was undertaken from April'1998 to March, 2000.

2.2. Description of the farm

The JAHAN-E-NIZAM BOHUMOKHI KRISHI KHAMAR was an integrated farm. The integration components were Fishery (Plate nos. 2, 3, 5, 6, 7, 8), Poultry, Dairy (Plate-11), Horticulture and Paddy cultivation. The total area of the farm was about 18 ha.

The lay out of the farm was in the map (Fig. 2) The southern most part of the farm was agriculture land used for rice cultivation during dry season. On the northern side of the agriculture land there was a large water body of 10 acre for fish culture. Next to it there were seven fish stocking ponds (Plate nos. 7, 8, 9, 10) and a fish breeding hatchery (Plate-1) with several nursery ponds (Plates nos. 4, 5, 6).

On the northern part of the farm there were cow and poultry sheds (Plate-11) and infront of it, there were some grazing land for napier grass culture. A bio-gas underground plant was also located here where cow dung was used. The concrete chamber temporarily hold slurry situated beside the gas plant (Plates-12, 13) The by-product of the plant was slurry (Plate-14), used as feed ingredients in the present study for fish.

2.3. Description of the experimental pond

To continue the research, seven ponds were used. All the ponds were more or less rectangular. The area and size of which was given in Table 1.u.

The depth of all the ponds varied from 2-2.5 m depending on the season. The bottom of the ponds was muddy. All the banks were covered with short grass and there were some coconut trees on the sides of the pond. The sloping of the pond was more or less steep, all the ponds were mainly rain fed and have the provision for supply of surface water when needed. There was also a tube-well facility during dry season.

Plate-1 : Fish Breeding Hatchery

Plate-2 : Collection of Fish Fry

Plate-3 : Fish fry

Plate-4 : Nursery ponds

Plate-5 : Pond No-1 (Area 0.34 ha)

Plate-6 : Pond No-2 (Area 0.35 ha)

Plate-7 : Pond No-3 (Area 0.36 ha)

Plate-8 : Pond No-4 (Area 0 .38 ha)

Plate-9 : Pond No-5 (Area 0.38 ha)

Plate-10 : Pond No-5 (Area0.38 ha)

Plate-11 : Dairy Farm

Plate-12 : Concrete Chamber of Bio-gas plant

2.4. Production of slurry

There was a bio-gas plant (biodigester) in the farm. Cow dung from the dairy was used as raw material in the gas-plant. The dairy wash water was also used for dilution of dung in plant. The by-product from the plant came out as a semi-solid materials known as slurry (Plate-14).

2.5. Preparation of special fish feed made from slurry

During the research programme, different types of feed was used. i.e. Sample-1, Sample-2, Sample-3.

Sample-1 : The slurry was used as fish feed (Plate-14).

Sample-2 : The mixture of slurry and mustard oil cake at a ratio of 60:40 (Plate-15).

Sample-3 : The mixture of slurry and mustard oil cake at a ratio of 70:30 (Plate-16).

Slurry and mustard oil cake was put in cement tank and left there for four days for fermentation, then the fermented materials were broad-casted in different ponds as fish feed (Plate-14).

2.6. Operation layout of the research work

In the present work seven ponds and four feed samples were considered, the lay-out of the research work is a comparative study between the feed, that was made from slurry with that of the standard feed, collected from local market.

Sample-1, slurry : applied to pond no. 1 and 2.

Sample-2, slurry : mustard oil cake (60:40); applied to pond no. 3 and 4.

Sample-3, slurry : mustard oil cake (70:30); applied to pond no. 5 and 6.

Sample-4, KRISHIKA feed (purchased from local market); applied to pond no. 7.

The work concerned to the study of the comparative account of physico-chemical variables of water, plankton, benthos, bio-mass, feed efficacy and relative growth weight of selective carp varites in each month of two years with 2 replications of population fluctuation at one year interval.

2.7. Physical variables of water

The area of each pond and its average depth was estimated by using a measuring tape graduated in centimeter and a graduated pole respectively.

Plate-13 : Slurry (Feed Sample-1)

Plate-14 : Slurry (Feed Sample-1)

Plate-15 : Fish feed (Feed sample-2)

Plate-16 : Fish feed (Feed sample-3)

PHYSICAL VARIABLES OF WATER

2.7.1. Temperature

The water temperature of each pond was recorded by a centigrade mercury thermometer graduated from 0-100^{0}C. At the time of sampling the corresponding air temperature was recorded simultaneously.

2.7.2. Water colour

The colour of water was recorded by eye-observation method.

2.7.3. Average depth

The average depth of the pond in different months was estimated by using a graduated pole. This was used to take series of measurements and the average depth was calculated in cm.

2.7.4. Transparency

The water transparancy in different months in all ponds was recorded by a secchi disc (20 cm diameter). The secchi disc visibility i.e. water transparency (turbidity) was generally related to plankton abundance. The water transparency was recorded by the following formula:

$$Zs = \frac{D_1 + D_2}{2}$$

Where,

Zs = Secchi disc depth;

D_1 = The depth when the disc was invisible (during sinking in water);

D_2 = The depth when the disc was visible (during withdrawing the disc).

The values were recorded in cm.

2.8. Chemical variables of water

The method of determination of chemical variables of water during the study was described below.

2.8.1. Dissolved Oxygen (DO)

The dissolved oxygen (DO) contents of the water was determined by the modification of Azide winkles method following by APHA (1985).

2.8.2. Free Carbon dioxide (CO_2)

Free Carbon-di-oxide of water sample was measured by using the HACH digital titrator to titrat 3.63N sodium hydroxide into a 100ml sample to which phenophthalin indicator had been added. Care was taken to perform this test as rapidly as possible after sampling the water (APHA 1985). So as to avoid the loss of CO_2.

2.8.3. Total Alkalinity

Total Alkalinity was estimated by titrating standard sulphuric acid solution with methyl-orange as indicator (APHA 1985).

2.8.4. Hardness

In the total hardness test the water sample was buffered. An orange dye was added which reacted with Ca^+, Mg^+ to give a red colour complex. The solution was then titrated with standard EDTA, to a blue end point. The amount of EDTA was directly proportional to the concentration of total hardness.

2.8.5. Hydrogen ion concentration (P^H)

Hydrogen ion concentration (p^H) of the collected water sample was determined by glass electrode (p^H) meter (Griffin p^H meter model-40). Accuracy is given as $\pm$ 0.02 P^H.

2.9. Analytical studies

2.9.1. Zooplankton and Phytoplankton

Sampling procedure

Sampling had been done in each pond at the last week of month, in each pond three stations were considered and demarcated as A, B, C with bamboo pole. All the sampling was done at 9 a.m. to 10 a.m. each day. The average values were considered.

Phytoplankton and Zooplankton sampling

For plankton sampling, a plankton net was used of about 63 µm mesh size having a filtering cone which was attached to a metal ring terminating in a collecting bottle. Each sample of plankton was obtained by filtering of water through the net, taken from each of the selected stations of the pond. Sample was then concentrated to 50ml, collected in a 100ml plastic bottle and persevered in 5% formalin.

Counting of Phytoplankton and Zooplankton

Under a compound microscope, identification and counting of planktons was done. There was a counting cell known as S-R cell (i.e. Sedgwick Rafter Plankton counting cell). By enumerating the number of plankton in each box of S-R cell, the total number of plankton per liter of water had been counted.

According to (Boyd *et al.* 1982)

$N = A \times 100 \times C/L$

Where,

N = no. of plankton/liter of water;

A = average numbers of planktons;

C = volume of final concentrate;

L = volume of original water expressed in liter.

The planktons were identified by the following books of Ward and Whipple (1959), Mellanby (1963), Needham and Needham (1966), Tonapi (1980) and Edmonson (1959).

2.9.2. Benthos

Sampling Procedure

Benthos sampling was done by Ekman-dredger. A metallic box had a sampling surface area of 225 cm^2. The benthos samples were collected from three-selected station at different depth zone, i.e. A,B,C of each pond.

Station A = 17-50 cm from the bank

Station B = 51-85 cm from the bank

Station C = 85-125 cm from the bank

The sediment samples passed through a series of sieve having 0.92 mm mesh size. The benthic fauna was cleaned and persevered in vials containing 10% formalin and brought to the laboratory for study.

Analysis of Benthos

The Benthic samples calculated as follows (Boyd *et al.* 1982)

$N = O \times 1000 / as$

Where,

O = number of organisms of various sampling;

a = area of the opening of Ek-man dredger;

s = replication frequency;

N = number of benthic organism/m^2 area.

These were identified with the help of a compound microscope and with some books of Ward and Whipple (1955), Needham and Needham (1966), Ali and Ishaque (1975).

2.9.3. Plankton bio-mass

Water sampling for bio-mass study

For bio-mass study, Kemmerer water sampler of 2-liter water capacity was used. Sampling had been done in three station as described in plankton. In each station, by using water sampler, sample was collected at 1 m depth from the surface.

Thus two liter of water samples (i.e. one liter from the surface and one liter from the depth) was collected in a dark-bottle with proper labeling and immediately brought to the laboratory for further procedure.

Determination of plankton bio-mass

Bio-mass of plankton refers to the weight of all plankton organisms present in a unit volume of water. To obtain the weight of the planktonic organisms, it required the organism to be separated from water by filtration. By gravimetric method the weight of plankton was measured as outlined by APHA (1975). In the present study both wet weight and constant dry weight of the organisms were taken.

2.9.3.1. Wet weight of Plankton

First, the filter paper was soaked in water and its weight was taken and this was the wet weight of filter paper. A sensitive electric balance (Scientech A 120, measure upto .01 mg) was used.

Collected sample was then filtered through 4.7 mm filter paper. After filtration, the weight of the filter paper was taken. This is the wet weight of plankton and filter paper.

Deducting the wet weight of filter paper from the weight of plankton with filter paper. The weight of plankton was found.

2.9.3.2. Constant dry weight of Plankton

The same sample was used for the determination of constant dry weight. Before filtration of sample, filter paper was dried at 60^{0}C in an incubator (Ogawa seiki com. ltd, Japan) for 24 hours and than cooled for two hours in a dessicator. Then the wet of the dried filter paper was taken with help of a very sensitive electronic balance. This procedure was repeated until a constant weight of the filter paper was obtained. The weight was then converted to weight in mg/l.

2.9.4. Proximate analysis of feed sample

The freshly collected feed samples were initially washed with tap water. And then with distilled water. Samples used for mineral determination, were washed with di-ionized water, then it was dried with blotting paper at room temperature to remove surface water, then the samples were immediately kept in a dessicator to avoid further evaporation of moisture from materials. The proximate composition, such as, moisture content, ash, crude fibre, protein, fat, carbohydrate was determined according to the method of Gopalon (1971). Minerals (major and trace elements) were determined by the standard method (Davis and Hillary, 1978).

In the present work four types of feed samples were considered.

Where,

Sample-I: Slurry;

Sample-II: Slurry : Mustard oil cake (60:40);

Sample-III: Slurry : Mustard oil cake (70:30).

Above mentioned samples were made from slurry but the sample-IV: KRISHIKA Brand, a control feed was collected from the local market.

The proximate analysis of these feed samples was done by the following ways:

2.9.4.1. Moisture Content

From each sample 3-5 g was taken separately in a constant weight crucible, all the samples were dried at 100-105^0 C temperature in an oven for 4 hours and cooled in a dessicator and weighted again. Heating, cooling and weighting were continued until constant weights of the samples were obtained.

Calculation

Initial weight = sample weight + crucible weight (before heating)

Final weight = sample weight + crucible weight (after heating)

Percentage of moisture: $\frac{\text{Intitial weight} - \text{Final weight}}{\text{Sample weight}} \times 100$

2.9.4.2. Ash Content

The feed samples were taken in accurately weighted porcelain crucible. First all the crucibles containing samples were placed in an oven 100-105^{0}C for four hours to remove moisture, then the moisture free samples were completely charred followed by heating in a muffle furnace for 5-6 hours at 600^0 C. These were cooled in a dessicator and weighted. To insure completion of ashing, the crucibles were again heated in the muffle furnace for half an hour, then cooled in a dessicator and weighted again. This process was repeated until a constant weight was obtained and the ash became almost white and grayish in colour.

Calculation

Weight of sample : Weight of sample + weight of crucible (Crucible before heating)

Weight of ash : weight of sample + weight of crucible (after heating)

Percentage of ash : $\dfrac{\text{Weight of ash}}{\text{Weight of sample}} \times 100$

2.9.4.3. Crude fibre

Reagent preparation

a. Sulphuric acid (0.255 N) solution of 7.08 ml was added in distilled water and it was made up to 1000 ml.
b. Sodium hydro-oxide (0.313 N) solution of 12.52 g was dissolved in distilled water and the volume was made up to 1000 ml.
c. Alcohol
d. Ether

Procedure

Moisture free samples 2-5 g and 200ml sulphuric acid (.255N) were poured into cleaned and oven dried 500 ml beaker. The mixture was boiled for 30 minutes, keeping the volume constant by addition of distilled water at frequent intervals. A glass rod was inserted in the beaker for smooth boiling. At the end of the boiling after 30 minutes the mixture was filtered through a muslin cloth and the residue was washed several times with hot water until it was made acid free.

The residue was then transferred into a 500 ml clean and dry beaker containing 200 ml of boiling sodium hydro-oxide (0.313 N). This was boiled for 30 minutes and the volume was kept constant by the addition of distilled water at frequent intervals.

A glass rod was put inside the beaker for smooth boiling. After boiling for 30 minutes the mixture was filtered through a muslin cloth and the residue was washed several times with hot water. Until the sample was made alkali free.

This sample was washed with some alcohol and then either to be served to get alkali free sample.

This alkali free sample was then transferred into a clean, furnace dried and pre-weighted porcelain crucible. This crucible with the residue was kept in an oven 105^{0}C for three hours, cooled in a desicator and weighted.

a. Next this crucible was heated in a muffle furnace and 600^0c for 3-4 hours, cooled and weighted again.

b. The difference in weights a-b represents the weight of crude fiber in the samples.

Calculation

$$\text{Percentage of crude fiber} = \frac{\{100 - (\text{moisture} + \text{fat})\} \times \text{weight of fiber}}{\text{Sample weight complete}}$$

2.9.4.4. Protein Content

Principle

The protein content of a food stuff was obtained by estimating the nitrogen content of the materials and multiplying the nitrogen value by 6.25. This was referred to as crude protein content, since the non protein nitrogen (NPN) present in the materials was taken into consideration in the present investigation.

The estimation of nitrogen was made by modified KJELDAHL method (Gopalan, 1971) which depended on the fact that organic nitrogen, when digested with concentrated sulphuric acid in the presence of a catalyst, was converted into ammonium sulphate, ammonia liberated by making in the solution alkaline was distilled into a known volume of standard acid which was then titrated.

Reagent preparation

i. Digestion mixture

Potassium sulphate and copper sulphate in a ratio of 98:2 were mixed well.

ii. Sulphuric acid solution (0.1 N)

Concentrated sulphuric acid (2.78 ml) was added in distilled water and the volume was made up to 1000 ml. The solution was standardized by sodium carbonate (0.1 N) solution.

iii. Sodium Carbonate solution (0.1 N)

Anhydrous sodium carbonate (5.3 g) was dissolved in the distilled water and the volume was made up to 1000 ml.

iv. Sodium Hydro-oxide solution (0.1 N)

Sodium hydro-oxide (4 g) was dissolve in distilled water and the volume was made up to 1000 ml. It was standardized by the standard sulphuric acid (0.1 N) solution.

v. Sodium Hydro-oxide (40%)

Sodium hydro-oxide (40 g) was dissolved in the distilled water and the volume was made up to 100 ml.

vi. Methyl red indicator

Methyl indicator (0.1 g) was dissolved in 60 ml alcohol and the volume was made up to 100 ml with distilled water.

Procedure

According to the principle of Kjildahl's method the following steps were done.

i. Digestion of the sample
ii. Distillation
iii. Titration

i. Digestion

The sample 0.5-2 g was poured in a 500 ml clean and oven dried kjildahl flask 5 g of digested mixture and 25 ml of pure concentrated sulphuric acid were added. To avoid frothing and bumping, a glass rod was placed inside the flask, a blank was carried with all reagents except sample materials for the comparison.

These flasks were then heated in a kjildahl digestion chamber, at low temperature (40^0C). Until the mixture no longer frothed and then heating was increased to 60^0C and was continued until the solution become colourless. At the end of the digestion period the flasks were cooled and diluted with 100 ml distilled water. A litmus paper was placed in the solution and the reaction was found to be acidic.

ii. Distillation

The kjildahl apparatus was thoroughly washed with distilled water before starting the distillation experiment, 25 ml of 0.1 N sulphuric acid was taken into the 250 ml conical flask, in a measuring cylinder 75 ml of 40% sodium hydro-oxide was taken and it was carefully poured down the side of the kjildahl flask. The litmus paper appeared blue indicating the solution as alkaline. The mouth of the flask was closed with a stopper containing connective tube and was ultimately connected to the ammonia-receiving flask containing 0.1 N sulphuric acid. The mixture was boiled at such a rate that water and ammonia distilled over at a steady moderate rate. The heating was not to slow so that the sulphuric acid solution might be sucked into the kjildahl flask and not to fast so that the distilling ammonia did not escape the sulphuric acid without absorption.

iii. Titration

The ammonia absorbed in the receiving flask, containing 0.1 N sulphuric acid, and was titrated with 0.1 N sodium hydro-oxide using 3 drops of methyle red as indicator. Similarly, a reagent blank was distilled and titrated.

Calculation

The calculation of the protein content of the sample on the percentage basis was given by the following formula;

$$\text{Percentage of Protein} = \frac{c - b \times 14\,d \times 6.25 \times 100}{a \times 1000}$$

Where,

a = sample weight (g)

b = volume of sodium hydro-oxide required for the back titration and to neutralized 25 ml of 0.1N sulphuric acid (for sample).

c = volume of sodium hydro-oxide required for the back titration and to neutralized 25 ml of 0.1 N sulphuric acid (for blank).

d = normality of sodium hydro-oxide used for titration, factor of nitrogen to protein is 6.25, atomic weight of nitrogen is 14.

2.9.4.5. Fat Content

Reagent preparation

i. Chloroform methanol solution: Chloroform was mixed with methanol in the ratio of 2 : 1.

ii. Sodium chloride solution (0.58%): Sodium chloride (0.58 g) was dissolved in distilled water and the final volume was made up to 100 ml.

Procedure

Total lipids were extracted by modification of the method described by Folch *et al.* (1957).

The moisture free sample was taken in a conical flask and to it 100 ml chloroform: methanol (2:1) solution was added. The sample was allowed to stand for over night and was filtered. The filtrated was taken in separate funnel to which 0.58% sodium chloride solution (20 ml) was added. The separating funnel was vigorously shacked for proper mixing and allowed to stand for 4-6 hours. The lower phase was then collected and washed with sodium chloride solution repeatedly till the lower phase was clear, finally the lower phase was collected in a dry weighted conical flask. The fat was then estimated gravimetrically.

$$\text{Percentage of fat} = \frac{\text{Weight of extract}}{\text{Sample weight}} \times 1000$$

2.9.4.6. Carbohydrate Content

Thc content of the available carbohydrate was calculated i.e. by subtracting the sum of value (per 100 g), for moisture, ash, protein, fat and crude fiber was 100.

2.9.4.7. Caloric Content

The caloric content of the algal materials was calculated by multiplying by carbohydrate, protein and fat by 4, 4 and 9 respectively.

2.9.5. Mineral Estimation

Reagent preparation

i. Acid mixture solution

Sulphuric acid perchloric acid and nitric acid was mixed slowly in a previously cleaned dried stopper bottle. The ratio of the mixture was 0.5:1:0.5.

ii. Hydroquinone solution

Hydroquinone (0.5 g) was dissolved in de-ionized water and one drop of concentrated sulfuric acid was added. The volume was made up to 100 ml by adding de-ionized water.

iii. Sodium Sulphate solution

Sodium sulphate (200 g) was dissolved in de-ionized water and the volume was made up to 100 ml and filtered.

iv. Ammonium molybdate solution

Ammonium molybdate (25 g) was dissolved in de-ionized water and 75 ml of concentrated sulphuric acid was added. The volume was made up to 500 ml.

v. Standard phosphate solution

Pure dry potassium dy-hydrogen phosphate (0.438 g) was dissolved in de-ionized water and dilute to one liter. Then 10 ml of this solution was made up to 100 ml with de-ionized water (1 ml = 0.01 mg phosphorus).

vi. Sodium chloride solution (1.0%)

Sodium chloride (0.635 g) was dissolved in de-ionized water and the volume was made up to 250 ml.

vii. Lanthanum solution (0.4%)

Atomic absorption grade lanthanum oxide (4.7 g) was transferred to a 500 ml beaker and dissolved with de-ionized water followed by 25 ml of concentrated hydro choleric acid. The beaker was then heated and stirred till the salt dissolved. The mixture was cooled and filtered into a one-liter volumetric flask and the volume was made up to 1000 ml.

viii. Nitric acid solution (2%)

Concentrated nitric acid (20 ml) was added to de-ionized water and the volume was made up to 1000 ml.

Preparation of working standard

2.9.5.I. Iron

Stock-I: Stock-I was supplied from Sigma chemicals. The concentration of iron was 995 mg/ml.

Stock-II: An aliquot of 10.02 ml from stock-I was taken in a volumetric flask and the volume was made up to 100 ml i.e. the concentration was 0.1 mg/ml.

Working standard: Aliquots of 2, 4, 6, 8 and 10 ml from stock-II were taken in five volumetric flasks. The volume was made up to 100 ml with de-ionized water. The concentrations of iron were 0.2, 0.4, 0.6, 0.8 and 1.0 mg/ml respectively. A blank was prepared simultaneously with the standard for calibration curve.

2.9.5.2. Zinc

Stock-I: Stock-I was supplied from Sigma chemicals and the concentration of zinc was 1000 mg/ml.

Stock-II: An aliquot of 2 ml was taken in a volumetric flask and the volume was made up to 100 ml with de-ionized water i.e. the concentration of zinc was 20 mg/ml.

Working standard: Aliquots of 2, 4, 6, 8 and 10 ml amount of stock-II were taken in five volumetric flasks and the volume was made up to 100 ml with de-ionized water, concentration of zinc were 40, 80, 120, 160 and 200 mg/ml respectively.

A blank was prepared simultaneously with standard caliber curve.

2.9.5.3. Copper

Stock-I: It was supplied from Sigma chemicals and the concentration of copper was 1000 mg/ml.

Stock-II: An aliquot of 2 ml was taken in a volumetric flask and the volume was made up to 100 ml with de-ionized water i.e. the concentration of copper was 20 mg/ml.

Working standard: Aliquots of 0.5, 1, 2, 3 and 4 ml amount of stock-II were taken in five volumetric flasks and the volume was made up to 100 ml with de-ionized water, concentration of copper were 10, 20, 40, 60 and 80 mg/ml respectively.

2.9.5.4. Calcium

Stock-I: It was supplied from Sigma chemicals and the concentration of calcium was 1000 mg/ml.

Stock-II: 10 ml of aliquot from stock-I was taken in a volumetric flask and the volume was made up to 100 ml with de-ionized water i.e. the concentration of calcium was 0.1 mg/ml.

Working standard: Aliquots of 2, 4, 6, 8 and 10 ml amount of stock-II were taken in five volumetric flasks concentrated sulphuric acid (2 ml) and 10 ml of lanthanum (0.4%) were added to each volumetric flask. The volume was made up to 100 ml with de-ionized water. The concentration of calcium was 0.2, 0.4, 0.6, 0.8 and 1.0 mg/ml respectively.

2.9.5.5. Magnesium

Stock-I: It was supplied from Sigma chemicals and the concentration of magnesium was 10.5 mg/ml.

Stock-II: An aliquot of 1.97 ml from stock-I was taken in a volumetric flask and the volume was made up to 100 ml with de-ionized water i.e. the concentration of magnesium was 20 mg/ml.

Working standard: Aliquots of 1, 2, 3, 4 and 5 ml amount of stock-II were taken in five volumetric flasks, 2 ml of concentrated sulphuric acid (2 ml) and10 ml of lanthanum (0.4%) were added to each volumetric flask. The volume was made up to 100 ml with de-ionized water. The concentration of magnesium were 20, 40, 60, 80 and 100 mg/ml respectively.

A blank was prepared simultaneously with the standard calibration curve.

2.9.5.6. Sodium

Stock-I: It was supplied from Sigma chemicals. The concentration of sodium was 1000 mg/ml.

Stock-II: An aliquots of 5 ml from stock-I was taken in a volumetric flask and the volume was made up to 100 ml with de-ionized water i.e. the concentration of sodium was 0.05 mg/ml.

Working standard: Aliquots of 1, 2, 3, 4 and 5 ml amount of stock-II were taken in five volumetric flasks, 2 ml of concentration sulphuric acid was added to each volumetric flask. The volume was made up to 100 ml with de-ionized water. The concentrations of sodium were 0.05, 0.15, 0.2, and 0.25 mg/ml respectively.

A blank was prepared simultaneously with the standard for calibration curve.

2.9.5.7. Potassium

Stock-I: It was supplied from Sigma chemicals and the concentration of potassium was 970 mg/ml.

Stock-II: An aliquots of 10.3 ml from stock-I was taken in a volumetric flask and the volume was made up to 100 ml with de-ionized water i.e. the concentration of Potassium was 0.1 mg/ml.

Working standard: Aliquots of 2, 4, 6, 8 and 10 ml amount of stock-II were taken in five volumetric flasks, 2 ml of concentrated sulphuric acid and 10 ml of sodium chloride (NaCl) (0.1%) were added to each volumetric flask. The volume was made up to 100 ml with de-ionized water. The concentrations of potassium were 0.2, 0.4, 0.6, 0.8 and 1.0 mg/ml respectively.

A blank was prepared simultaneously with the standard for calibration curve.

Analytical Technique

During the analysis of minerals extreme caution had been taken to avoid contamination of glasswares and reagents used for minerals analysis. De-ionized water was used for mineral analysis throughout the procedure; all glasswares were sobbed overnight in 2% nitric acid.

Sample (5 g) was taken in a flask and 2 ml acid mixture (sulphuric acid : perchloric acid : nitric acid = 0.5:1:0.5) was added. The mixture was digested in heating block until it was clear, after digestion it was diluted with de-ionized water. The concentration of iron, zinc, copper, calcium and magnesium were determined by the use of an atomic absorption specto-photometer fitted with single element bellow cathode lamp a three spelt burner head.

Sodium and potassium were determined by emission specto-photometer standard air acetylene flame was used for all elements except phosphorus analysis. Instrument setting and other experimental condition were in accordance with the manufacturer specification (pye. unium SP-9-800, Cambridge, England).

During the determination of calcium and magnesium, lanthanum (0.4%) was added to over come the ionic interference. The mineral content of the sample was calculated by multiplying the appropriate dilution factor.

The relationship between specto-photometer reading and mineral concentration was linear over a range of concentration represented in each working standard.

Determination of growth and production of fish

On monthly basis weight data was recorded. At least 10% of the fish from a pond was caught (Plate-18) and measured by the meter-scale and a balance. The weight was thus recorded and then the average result was kept in record. This was done in all ponds at the same system for each and every species.

2.9.6. Growth-weight and Production of fish

During the research programme, seven ponds with different water area were used. Selective fish varietis (Silver Carp, Catla : Rui : Mrigal, Carpio) were recruited at the ratio of 4:2:4 in the first year and 3:2:5 ratio at second year, supplementary feed was applied to different water body at 2-3 % of body weight (Plate-17).

Monthly sampling had been done on the last week of every month (Plates 18, 19). At least 10% of the fish was caught for growth study. For sampling, Ber-Jal was used. The fishes were very carefully handled for weight.

3.0 RESULTS AND OBSERVATION

3.1. Physical Variables of Water

The different climatic factors observed during the study period and in different months was presented below. Among the physical variables water colour, rain fall, sun-shine, humidity, water depth, water transprancy, air and water temperature were observed in every month.

3.1.1. Water colour

During the study period four feed samples were used in seven ponds.

By the application of these supplemental feeds in different ponds, in the first year of study period the water colour became light green in October'98, February and March'99; the colouration was green during the rest of the period (Table-1v).

In the second year of the study period, the water colouration became light green in September and October'99 and February and March, 2000 (Table-2).

3.1.2. Rainfall

The Rainfall influenced the physical and chemical conditions of water that ultimately affected the fish growth. During two years of the study period, the rainfall was maximum in July'98 and September'99 and minimum in December'98 and January, 2000 respectively (Figs. 3, 4, Table-3). Rainfall was the source of water in all ponds under the present study.

3.1.3. Sun-shine

During the study period, the average sun-shine hours in different month was given in Table-4. The average sun-shine was high in February'99 and March, 2000 and low in August'98 and July'99 respectively (Figs. 5, 6, Table-4).

3.1.4. Humidity

In tropical countries, humidity was an important climatological factor that influences the growth of fish. During the study period the fluctuation of humidity in monthly basis was recorded and it was maximum in August'98 and September'99 and minimum in February'99 and March, 2000 (Fig. 7, Table-5).

3.1.5. Water Depth

The water depth in different pond was recorded every month and given in Figs. 8, 9, Tables 6, 7 as follows: Incase of pond no. 1, in the first year the depth was 193 cm in September'98 and 160 cm in May'98. In second year it was 170 cm in June'99 and 208 cm in September'99.

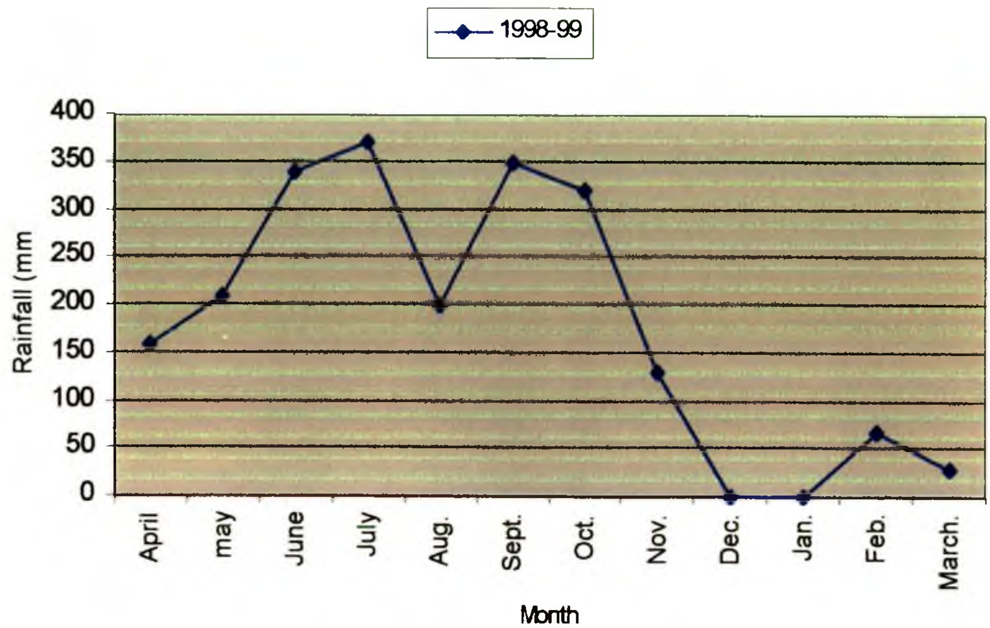


Fig-3 : Monthly fluctuation of Rainfall of the studied area during April'98-March'99

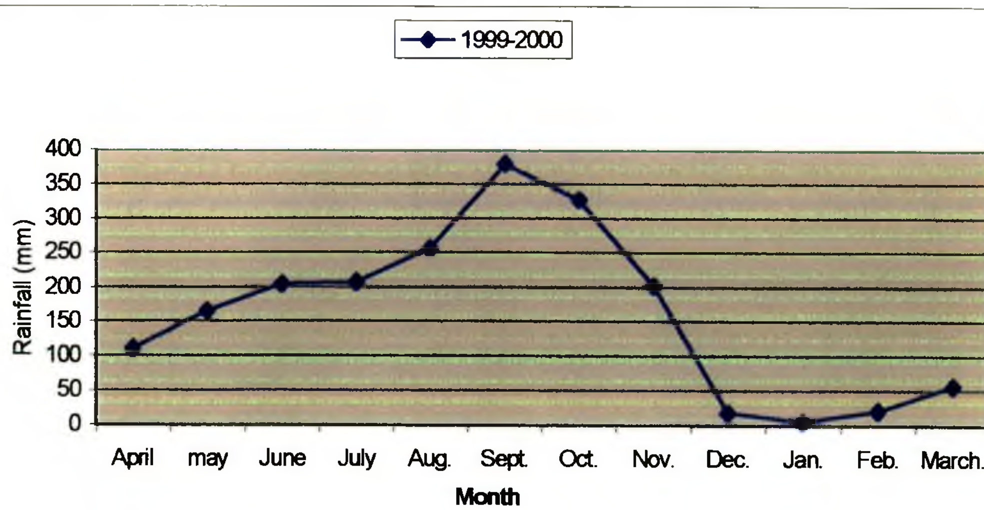


Fig-4 : Monthly fluctuation of Rainfall of the studied area during April '99-March 2000

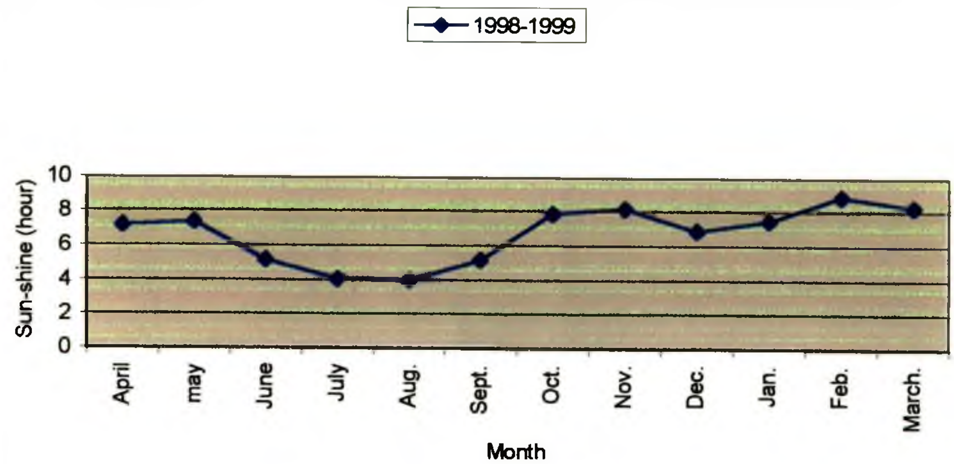


Fig-5 :Monthly fluctuation of Sun-shine of the studied area during April '98-March '99

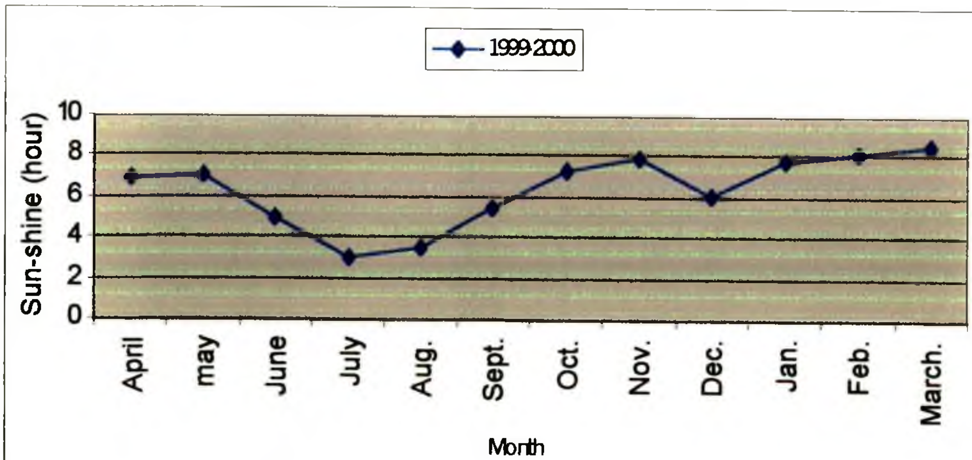


Fig-6 : Monthly fluctuation of Sun-shine of the studied area during April '99-March, 2000

Incase of pond no. 2 in the first year the water depth was 161cm in May'98 and 192 cm in September'98. In second year it was 172 cm in June'99 and 201 cm in September'99. Incase of pond no. 3 in the first year the water depth was 154 cm in May'98 and 192 cm in September'98. In second year it was 158 cm in May'99 and 193 cm in September'99. Incase of pond no. 4 in the first year the water depth was 160 cm in May'98 and 190 cm in September'98. In the second year it was 154 cm in May'99 and 187 cm in September'99. Incase of pond no. 5 in the first year the water depth was 155 cm in May'98 and 192 cm in October'98. In second year it was 160 cm in May'99 and 190 cm in October'99. In case of pond no. 6 in the first year the water depth was 157 cm in May'98 and 194 cm in September'98. In the second year it was 159 cm in May'99 and 188 cm in October'99. In case of pond no. 7 in the first year the water depth was 153 cm in May'98 and 186 cm in September'98. In the second year it was 160 cm in May'99 and 192 cm in September'99.

3.1.6. Water Transparency

Through out the study period four types of feed samples were applied in different ponds resulting in the different transparency visibility (Figs. 10, 11, Tables 8, 9). The transparency showed that light penetration was maximum due to heavy rainfall which are known to reduction the plankton density and the organic debris rapidly decomposed due to high temperature and virtually made the water clear. In the research work by applying feed Sample-1 in pond no. 1, secchi-disc visibility ranged from 28.6 cm to 34 cm (Table-8) in the first year and 28.9 cm to 33.7 cm (Table-9) in second year. In pond no. 2 it was 28.7 cm to 34 cm (Table-8) in the first year and 29.6 cm to 33.5 cm (Table-9) in the second year.

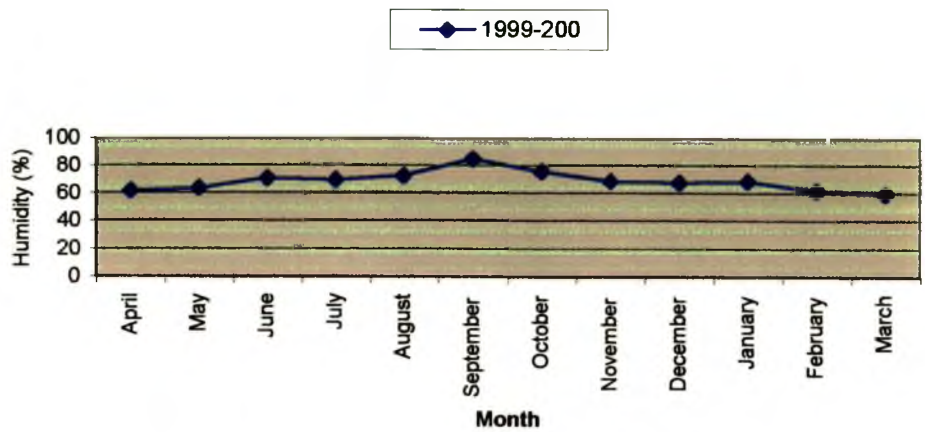


Fig-7 : Monthly fluctuation of Humidity of the studied area during April '99-March 2000

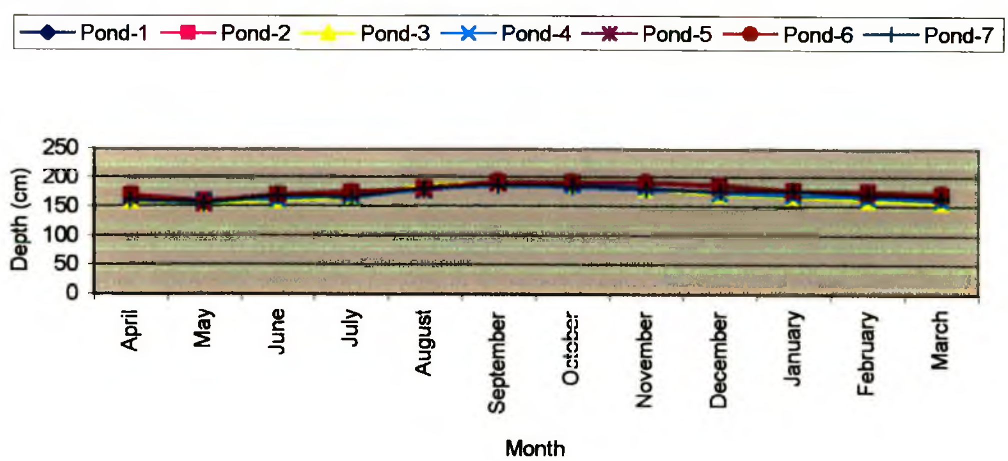


Fig-8 : Monthly fluctuations of water depth of different ponds in April '98-March '99

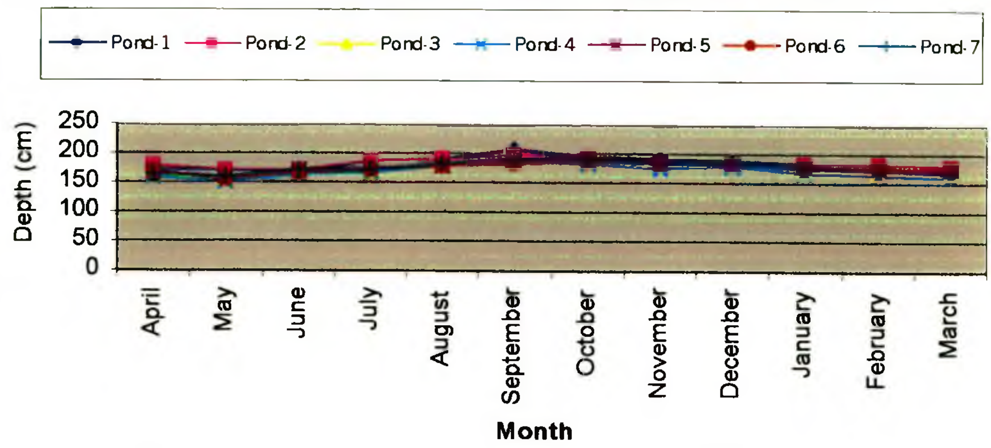


Fig-9 : Monthly fluctuations of water depth of different ponds in April '99-March 2000

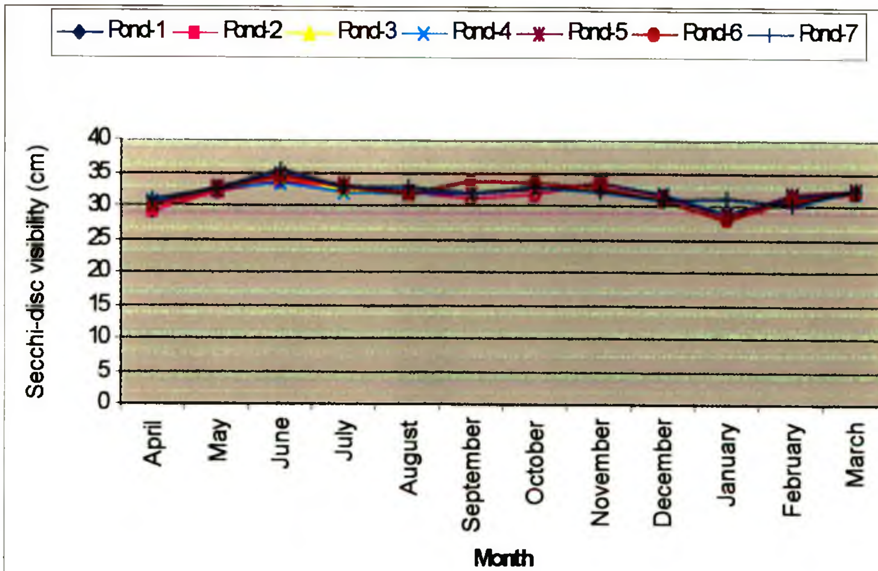


Fig-10 : Monthly fluctuations of Secchi-disc visibility of different ponds in April '98-March '99

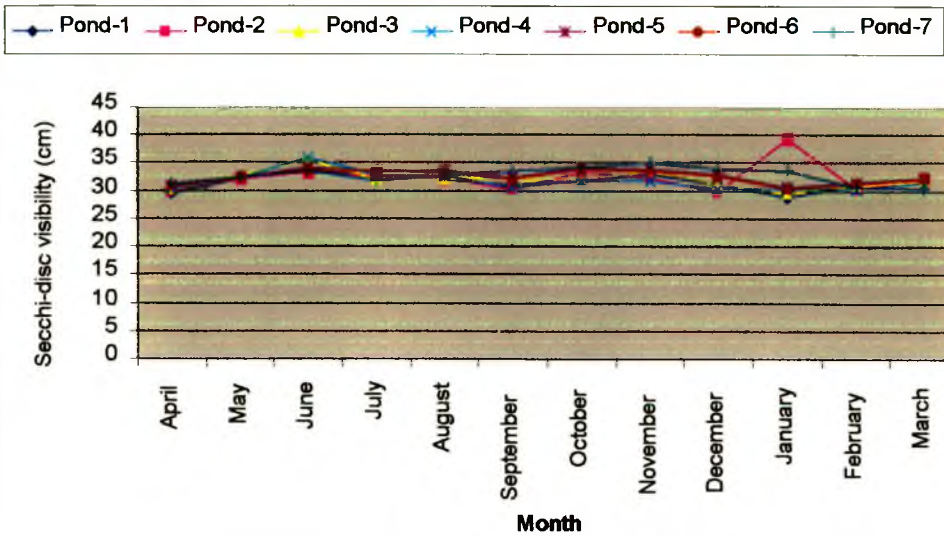


Fig-11 : Monthly fluctuations of Secchi-disc visibility of different ponds in April '99-March 2000

By applying feed sample no. 2 in pond no. 3 the secchi-disc visibility ranged from 28.8 cm to 34.5 cm (Table-8) in the first year and 29.6 cm to 35.7 cm (Table-9) in the second year. In pond no. 4 it ranged from 29 cm to 33.6 cm (Table-8) in the first year and 30.5 cm to 35.9 cm (Table-9) in the second year. By applying feed sample no. 3 in pond no. 5 the secchi-disc visibility ranged from 30.4 cm to 34.7 cm (Table-8) in the first year and 30.7 cm to 34.2 cm (Table-9) in the second year. In pond no. 6 it was 28.15 cm to 34.5 cm (Table-8) in the first year and 30.4 cm to 34 cm (Table-9) in the second year. By applying feed sample no. 4 in pond no. 7 the secchi-disc visibility ranged from 30.3 cm to 35.5 cm (Table-8) in the first year and 30.60 cm to 35.05 cm (Table-9) in the second year.

3.1.7. Temperature

In case of pond no. 1 during first year of the study period the air temperature was minimum (22.3 °C) in December'98 and maximum (32.3 °C) in April'98 (Fig. 12, Table nos. 1.f, 10), in the second year it was minimum (21.9 °C) in December'99 and maximum (33.3 °C) in July'99 (Fig. 13, Table nos. 1.f, 11). The water temperature during first year of the study period incase of pond no. 1 was minimum (23.5 °C) in December'98 and maximum (33.2 °C) in July'98 (Fig. 14, Table nos. 1.f, 12), in the second year it was minimum (23.1 °C) in December'99 and maximum (33.5 °C) in June'99 (Fig. 15, Table nos. 1.f, 13). The minimum water temperature (23.5 °C) and air temperature (22.3 °C) was in December'98 in the first year where the water temperature was slightly higher (.8 °C) than the air temperature. In the second year the minimum water temperature and air temperature was also in December'99 where the water temperature was higher (1.2 °C) than the air temperature. In that period the maximum water temperature was 33.2^0 C in July'98, similarly at that time the air temperature was 31^0 C i.e. the water temperature was 2.2^0 C higher than air temperature.

In case of pond no. 2 during first year of the study period the air temperature was minimum (22.3 °C) in December'98 and maximum (32.2 °C) in April'98 (Fig. 12, Table nos. 1.f, 10), in the second year it was minimum (21.9 °C) in December'99 and maximum (33.4 °C) in July'99 (Fig. 13, Table nos. 1.f, 11). The water temperature during first year of the study period incase of pond no. 2 was minimum (23.5 °C) in December'98 and maximum (33.1 °C) in July'98 (Fig. 14, Table nos. 1.f, 12), in the second year it was minimum (23 °C) in December'99 and maximum (33.5 °C) in April'99 (Fig. 15, Table nos. 1.f, 13). In case of pond no. 3 during first year of the study period the air temperature was minimum (22.7 °C) in

December'98 and maximum (32 °C) in April'98 (Fig. 12, Table nos. 1.f, 10), in the second year it was minimum (22 °C) in December'99 and maximum (33.4 °C) in July'99 (Fig. 13, Table nos. 1.f, 11). The water temperature during first year of the study period incase of pond no. 3 was minimum (23.5 °C) in December'98 and maximum (33.4 °C) in April'98 (Fig. 14, Table nos. 1.f, 12), in the second year it was minimum (23.5 °C) in December'99 and maximum (33.5 °C) in July'99 (Fig. 15, Table nos. 1.f, 13). In case of pond no. 4 during first year of the study period the air temperature was minimum (22.4 °C) in December'98 and maximum (32.2 °C) in April'98 (Fig. 12, Table nos. 1.f, 10), in the second year it was minimum (21.9 °C) in December'99 and maximum (33.3 °C) in July'99 (Fig. 13, Table nos. 1.f, 11). The water temperature during first year of the study period incase of pond no. 4 was minimum (23.4 °C) in December'98 and maximum (33.4 °C) in April'98 (Fig. 14, Table nos. 1.f, 12), in the second year it was minimum (23.1 °C) in December'99 and maximum (33.5 °C) in July'99 (Fig. 15, Table nos. 1.f, 13). In case of pond no. 5 during first year of the study period the air temperature was minimum (22.5 °C) in December'98 and maximum (32.1 °C) in April'98 (Fig. 12, Table nos. 1.f, 10), in the second year it was minimum (21.2 °C) in December'99 and maximum (32.8 °C) in June'99 (Fig. 13, Table nos. 1.f, 11). The water temperature during first year of the study period incase of pond no. 5 was minimum (23.9 °C) in December'98 and maximum (33.3 °C) in April'98 (Fig. 14, Table nos. 1.f, 12), in the second year it was minimum (22.4 °C) in December'99 and maximum (32.9 °C) in July'99 (Fig. 15, Table nos. 1.f, 13). In case of pond no. 6 during first year of the study period the air temperature was minimum (22.5 °C) in December'98 and maximum (32.1 °C) in April'98 (Fig. 12, Table nos. 1.f, 10), in the second year it was minimum (21.1 °C) in December'99 and maximum (32.7 °C) in June'99 (Fig. 13, Table nos. 1.f, 11). The water temperature during first year of the study period incase of pond no. 6 was minimum (23.4 °C) in December'98 and maximum (33.2 °C) in April'98 (Fig. 14, Table nos. 1.f, 12), in the second year it was minimum (22.4 °C) in December'99 and maximum (32.9 °C) in July'99 (Fig. 15, Table nos. 1.f, 13). In case of pond no. 7 during first year of the study period the air temperature was minimum (22 °C) in December'98 and maximum (32.8 °C) in April'98 (Fig. 12, Table nos. 1.f, 10), in the second year it was minimum (21.5 °C) in December'99 and maximum (33.3 °C) in June'99 (Fig. 13, Table nos. 1.f, 11). The water temperature during first year of the study period incase of pond no. 7 it was minimum (22.5 °C) in December'98 and maximum (33.2 °C) in July'98 (Fig. 14, Table nos. 1.f, 12), in the second year it was minimum (23.1 °C) in December'99 and maximum (33.5 °C) in July'99 (Fig. 15, Table nos. 1.f, 13).

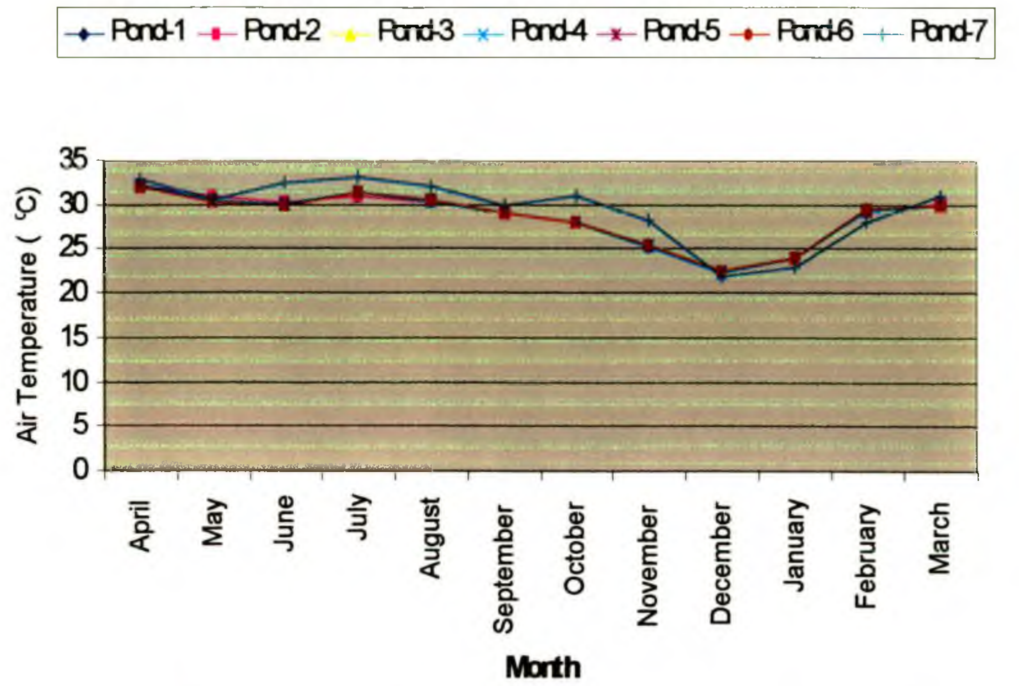


Fig-12 : Monthly fluctuations of Air Temperatue of different ponds in April '98-March '99

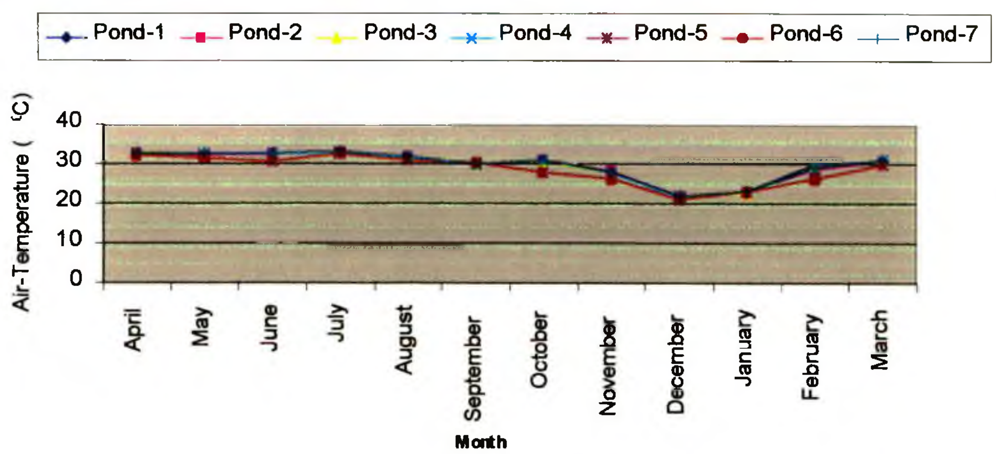


Fig-13 : Monthly fluctuations of Air-Temperature of different ponds in April '99-March 2000

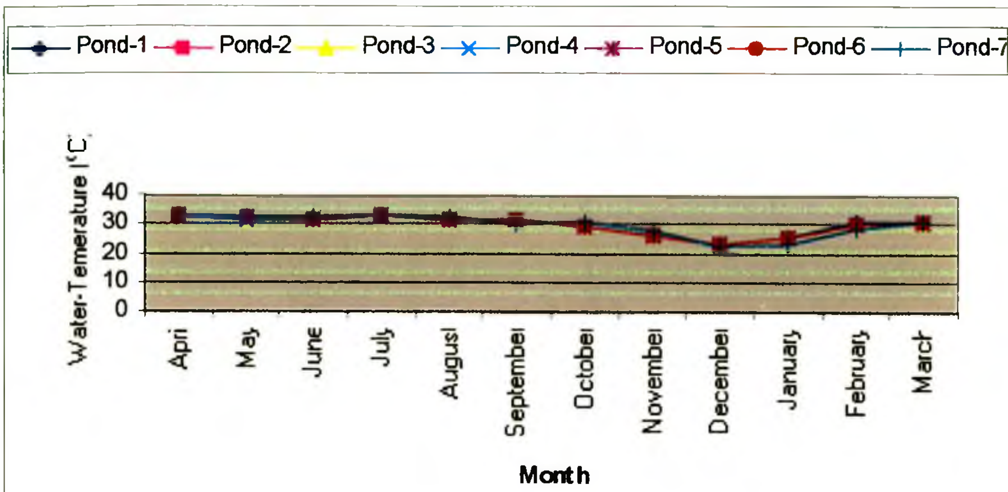


Fig-14 : Monthly fluctuations of Water-Temperature of different ponds in April '98-March'99

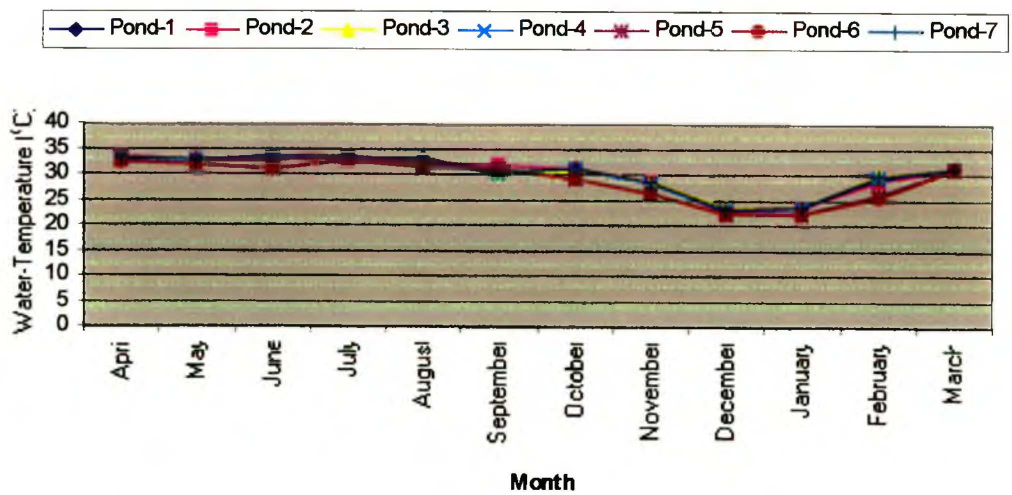


Fig-15 : Monthly fluctuations of Water-Temperature of different ponds in April '99-March 2000

3.2. Chemical Variables of Water

Monthly fluctuation of chemical variables of water body, such as P^H, dissolved oxygen, free carbon dioxide, hardness, total alkalinity were recorded. Zhang *et al.* (1987) observed that the physico-chemical parameter was largely determined by the pond size, depth, species density etc. These chemical variables affected the growth of fish.

3.2.1. Hydrogen ion-concentration (p^H)

According to Karim (1975) fresh water is classified as acid, neutral or alkaline, depending upon the hydrogen-ion concentration. Water P^H in different ponds under present study showed different changes by the application of different feed samples.

In case of pond no. 1 during first year of the study period, the p^H-value was minimum i.e. 6.5 in November'98 and maximum i.e. 7.2 in September'98 (Fig. 16, Table nos. 1.h, 14), while in second year of the study period, it was minimum i.e. 6.8 in December'99 and was maximum i.e. 7.9 in September'99 (Fig. 16, Table nos. 1.h, 15), in the first year of study period, the water was slightly alkaline, while in the second year it was slightly acidic. In case of pond no. 2 during first year of the study period, the p^H-value was minimum i.e. 6.8 in May'98 and maximum i.e. 7.4 in October'98 (Fig. 16, Table nos. 1.h, 14), while in second year of the study period, it was minimum i.e. 6.5 in January, 2000 and was maximum i.e. 7.5 in October'99 (Fig. 16, Table nos. 1.h, 15). In case of pond no. 3 during first year of the study period, the p^H-value was minimum i.e. 6.5 in October'98 and maximum i.e. 8.3 in March'99 (Fig. 16, Table nos. 1.h, 14), while in second year of the study period, it was minimum i.e. 6.8 in August'99 and was maximum i.e. 7.7 in March, 2000 (Fig. 16, Table nos. 1.h, 15). In case of pond no. 4 during first year of the study period, the p^H-value was minimum i.e. 6.3 in October'98 and maximum i.e. 8.4 in March'99 (Fig. 16, Table nos. 1.h, 14), while in second year of the study period, it was minimum i.e. 6.8 in November'99 and was maximum i.e. 7.3 in January, 2000 (Fig. 16, Table nos. 1.h, 15). In case of pond no. 5 during first year of the study period, the p^H-value was minimum i.e. 6.3 in May'98 and maximum i.e. 7.3 in August'98 (Fig. 16, Table nos. 1.h, 14), while in second year of the study period, it was minimum i.e. 6.4 in February, 2000 and was maximum i.e. 7.4 in July'99 (Fig. 16, Table nos. 1.h, 15). In case of pond no. 6 during first year of the study period, the p^H-value was minimum i.e. 6.4 in May'98 and maximum i.e. 7.3 in December'98 (Fig. 16, Table nos. 1.h, 14), while in second year of the study period, it was minimum i.e. 6.6 in January, 2000 and was maximum i.e. 7.3 in July'99 (Fig. 16, Table nos. 1.h, 15). In case of pond no. 7 during first year of the study period, the p^H-value was minimum i.e. 6.8 in April'98 and maximum i.e. 7.5 in July'98 (Fig. 16, Table nos. 1.h, 14), while in second year of the study period, it was minimum i.e. 6.8 in October'99 and was maximum i.e. 7.3 in July'99 (Fig. 16, Table nos. 1.h, 15).

3.2.2. Dissolved Oxygen

The pond water receives oxygen mainly from atmosphere and by photosynthesis of chlorophyll bearing organisms (Jhingran 1985). Dissolved oxygen in different ponds water under present study showed different changes by the application of different feed samples.

In case of pond no. 1 during first year of the study period the DO-value was minimum i.e. 6.5 mg/l in July'98 and maximum i.e. 7.5 mg/l in October'98 (Fig. 17, Table nos. 1.j, 16), while in second year of the study period, it was minimum i.e. 7.2 mg/l in March, 2000 and was maximum i.e. 8.2 mg/l in September'99 (Fig. 17, Table nos. 1.j, 17). In case of pond no. 2 during first year of the study period the DO-value was minimum i.e. 6.8 mg/l in September'98 and maximum i.e. 7.2 mg/l in April'98 (Fig. 17, Table nos. 1.j, 16), while in second year of the study period, it was minimum i.e. 6.9 mg/l in January, 2000 and was maximum i.e. 7.8 mg/l in August'99 (Fig. 17, Table nos. 1.j, 17). In case of pond no. 3 during first year of the study period the DO-value was minimum i.e. 6.5 mg/l in October'98 and maximum i.e. 12 mg/l in March'99 (Fig. 17, Table nos. 1.j, 16), while in second year of the study period, it was minimum i.e. 7 mg/l in October'99 and was maximum i.e. 10.3 mg/l in March, 2000 (Fig. 17, Table nos. 1.j, 17). In case of pond no. 4 during first year of the study period the DO-value was minimum i.e. 7.2 mg/l in September'98 and maximum i.e. 9.6 mg/l in March'99 (Fig. 17, Table nos. 1.j, 16), while in second year of the study period, it was minimum i.e. 7.8 mg/l in October'99 and was maximum i.e. 9.2 mg/l in April'99 (Fig. 17, Table nos. 1.j, 17). In case of pond no. 5 during first year of the study period the DO-value was minimum i.e. 6.9 mg/l in March'99 and maximum i.e. 8.8 mg/l in September'98 (Fig. 17, Table nos. 1.j, 16), while in second year of the study period, it was minimum i.e. 7.3 mg/l in March, 2000 and was maximum i.e. 8.9 mg/l in September'99 (Fig. 17, Table nos. 1.j, 17). In case of pond no. 6 during first year of the study period the DO-value was minimum i.e. 7 mg/l in March'99 and maximum i.e. 8.9 mg/l in June'98 (Fig. 17, Table nos. 1.j, 16), while in second year of the study period, it was minimum i.e. 7.8 mg/l in November'99 and was maximum i.e. 8.6 mg/l in Augus'99 (Fig. 17, Table nos. 1.j, 17). In case of pond no. 7 during first year of the study period the DO-value was minimum i.e. 8.1 mg/l in August'98 and maximum i.e. 9.1 mg/l in April'98 (Fig. 17, Table nos. 1.j, 16), while in second year of the study period, it was minimum i.e. 7.7 mg/l in October'99 and was maximum i.e. 9.2 mg/l in April'99 (Fig. 17, Table nos. 1.j, 17).

By comparing all the dissolved oxygen data in different ponds, it may be observed the quantity of dissolved oxygen in pond water was within limit.

3.2.3. Carbon dioxide

Carbon dioxide in natural waters is derived from various sources i.e. the atmosphere, respiration of animals and plants in water, bacterial decomposition etc (Jhingran 1985). Carbon dioxide in different ponds water under present study showed different changes by the application of different feed samples.

In case of pond no. 1 during first year of the study period the carbon dioxide value was minimum i.e. 11 mg/l in January'99 and maximum i.e. 12.1 mg/l in August'98 (Fig. 18, Table nos. 1.i, 18), while in second year of the study period, it was minimum i.e. 10.9 mg/l in May'99 and was maximum i.e. 12.7 mg/l in November'99 (Fig. 18, Table nos. 1.i, 19). In case of pond no. 2 during first year of the study period the carbon dioxide value was minimum i.e. 11.1 mg/l in April'98 and maximum i.e. 12.5 mg/l in December'98 (Fig. 18, Table nos. 1.i, 18), while in second year of the study period, it was minimum i.e. 10.9 mg/l in April'99 and was maximum i.e. 12.4 mg/l in March, 2000 (Fig. 18, Table nos. 1.i, 19). In case of pond no. 3 during first year of the study period the carbon dioxide value was minimum i.e. 6 mg/l in July'98 and maximum i.e. 13.2 mg/l in October'98 (Fig. 18, Table nos. 1.i, 18), while in second year of the study period, it was minimum i.e. 5.3 mg/l in February, 2000 and was maximum i.e. 9.3 mg/l in May'99 (Fig. 18, Table nos. 1.i, 19). In case of pond no. 4 during first year of the study period the carbon dioxide value was minimum i.e. 5 mg/l in October'98 and maximum i.e. 8.4 mg/l in May'98 (Fig. 18, Table nos. 1.i, 18), while in second year of the study period, it was minimum i.e. 7.4 mg/l in July'99 and was maximum i.e. 8.3 mg/l in September'99 (Fig. 18, Table nos. 1.i, 19). In case of pond no. 5 during first year of the study period the carbon dioxide value was minimum i.e. 10.2 mg/l in January'99 and maximum i.e. 12.8 mg/l in November'98 (Fig. 18, Table nos. 1.i, 18), while in second year of the study period, it was minimum i.e. 10.1 mg/l in September'99 and was maximum i.e. 12.3 mg/l in October'99 (Fig. 18, Table nos. 1.i, 19). In case of pond no. 6 during first year of the study period the carbon dioxide value was minimum i.e. 10 mg/l in April'98 and maximum i.e. 13 mg/l in July'98 (Fig. 18, Table nos. 1.i, 18), while in second year of the study period, it was minimum i.e. 10.5 mg/l in March, 2000 and was maximum i.e. 11.9 mg/l in October'99 (Fig. 18, Table nos. 1.i, 19). In case of pond no. 7 during first year of the study period the carbon dioxide value was minimum i.e. 8 mg/l in May'98 and maximum i.e. 9.2 mg/l in January'99 (Fig. 18, Table nos. 1.i, 18), while in second year of the study period, it was minimum i.e. 7.6 mg/l in July'99 and was maximum i.e. 8.3 mg/l in April'99 (Fig. 18, Table nos. 1.i, 19). The data's of all other ponds are comparatively within productive limit.

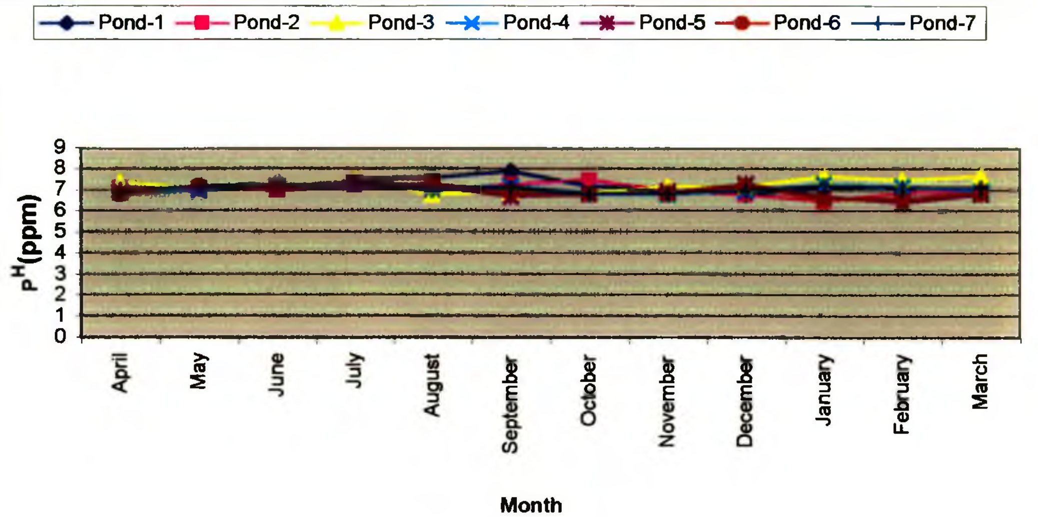


Fig-16 : Monthly fluctuation of "P^H" of the studied ponds during the year April '99- March, 2000

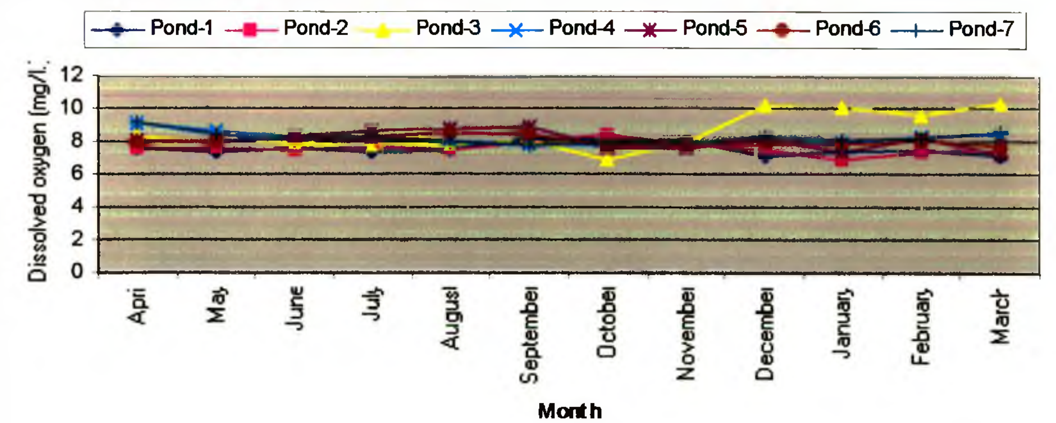


Fig-17 Montly fluctuation of Dissolved oxygen of different ponds water during April '99-March 2000

3.2.4. Alkalinity

The term Alkalinity was some what related with the concentration of carbonate, bicarbonate and hydroxide ions in the water are expressed as $CaCo_3$. Alkalinity in different ponds water under present study showed different changes by the application of different feed samples.

In case of pond no. 1 during first year of the study period the alkalinity value was minimum i.e. 80 ppm in April'98 and maximum i.e. 91 ppm in November'98 (Fig. 19, Table nos. 1.l, 20), while in second year of the study period, it was minimum i.e. 78 ppm in March, 2000 and was maximum i.e. 97 ppm in October'99 (Fig. 20, Table nos. 1.l, 21). In case of pond no. 2 during first year of the study period the alkalinity value was minimum i.e. 84 ppm in May'98 and maximum i.e. 94 ppm in December'98 (Fig. 19, Table nos. 1.l, 20), while in second year of the study period, it was minimum i.e. 81 ppm in September'99 and was maximum i.e. 92 ppm in February, 2000 (Fig. 20, Table nos. 1.l, 21). In case of pond no. 3 during first year of the study period the alkalinity value was minimum i.e. 50 ppm in May'98 and maximum i.e. 120 ppm in July'98 (Fig. 19, Table nos. 1.l, 20), while in second year of the study period, it was minimum i.e. 61 ppm in May'99 and was maximum i.e. 118 ppm in September'99 (Fig. 20, Table nos. 1.l, 21). In case of pond no. 4 during first year of the study period the alkalinity value was minimum i.e. 50 ppm in June'98 and maximum i.e. 111 ppm in August'98 (Fig. 19, Table nos. 1.l, 20), while in second year of the study period, it was minimum i.e. 70 ppm in June'99 and was maximum i.e. 91 ppm in November'99 (Fig. 20, Table nos. 1.l, 21). In case of pond no. 5 during first year of the study period the alkalinity value was minimum i.e. 81 ppm in December'98 and maximum i.e. 90 ppm in February'99 (Fig. 19, Table nos. 1.l, 20), while in second year of the study period, it was minimum i.e. 81 ppm in December'99 and was maximum i.e. 91 ppm in March'2000 (Fig. 20, Table nos. 1.l, 21). In case of pond no. 6 during first year of the study period the alkalinity value was minimum i.e. 81 ppm in June'98 and maximum i.e. 91 ppm in February'99 (Fig. 19, Table nos. 1.l, 20), while in second year of the study period, it was minimum i.e. 80 ppm in May'99 and was maximum i.e. 89 ppm in September'99 (Fig. 20, Table nos. 1.l, 21). In case of pond no. 7 during first year of the study period the alkalinity value was minimum i.e. 80 ppm in April'98 and maximum i.e. 94 ppm in November'98 (Fig. 19, Table nos. 1.l, 20), while in second year of the study period, it was minimum i.e. 76 ppm in January, 2000 and was maximum i.e. 85 ppm in August'99 (Fig. 20, Table nos. 1.l, 21).

3.2.5. Hardness

Hardness is a measurement of the concentration of divalent metal ions (Principally Ca^{+2} and Mg^{+2}). The concentration is expressed as the equivalent concentration of calcium carbonate ($Caco_3$), i.e. the concentration of $Caco_3$ which would be required in pure water to give the same concentration of divalent metal ions as in the water sample. During present study.

In case of pond no. 1 during first year of the study period the hardness value was minimum i.e. 95.9 mg/l in January'99 and maximum i.e. 109 mg/l in August'98 (Fig. 21, Table nos. 1.k, 22), while in second year of the study period, it was minimum i.e. 117 mg/l in December'99 and was maximum i.e. 135 mg/l in August'99 (Fig. 21, Table nos. 1.k, 23). In case of pond no. 2 during first year of the study period the hardness value was minimum i.e. 100 mg/l in April'98 and maximum i.e. 118 mg/l in October'98 (Fig. 21, Table nos. 1.k, 22), while in second year of the study period, it was minimum i.e. 103 mg/l in December'99 and was maximum i.e. 123 mg/l in September'99 (Fig. 21, Table nos. 1.k, 23). In case of pond no. 3 during first year of the study period the hardness value was minimum i.e. 92 mg/l in June'98 and maximum i.e. 120 mg/l in January'99 (Fig. 21, Table nos. 1.k, 22), while in second year of the study period, it was minimum i.e. 95.9 mg/l in July'99 and was maximum i.e. 111.5 mg/l in January, 2000 (Fig. 21, Table nos. 1.k, 23). In case of pond no. 4 during first year of the study period the hardness value was minimum i.e. 92.8 mg/l in June'98 and maximum i.e. 118 mg/l in February'99 (Fig. 21, Table nos. 1.k, 22), while in second year of the study period, it was minimum i.e. 95 mg/l in June'99 and was maximum i.e. 107 mg/l in October'99 (Fig. 21, Table nos. 1.k, 23). In case of pond no. 5 during first year of the study period the hardness value was minimum i.e. 99 mg/l in December'98 and maximum i.e. 114 mg/l in October'98 (Fig. 21, Table nos. 1.k, 22), while in second year of the study period, it was minimum i.e. 100 mg/l in December'99 and was maximum i.e. 114 mg/l in April'99 (Fig. 21, Table nos. 1.k, 23). In case of pond no. 6 during first year of the study period the hardness value was minimum i.e. 98 mg/l in February'99 and maximum i.e. 115 mg/l in October'98 (Fig. 21, Table nos. 1.k, 22), while in second year of the study period, it was minimum i.e. 101 mg/l in May'99 and was maximum i.e. 117 mg/l in October'99 (Fig. 21, Table nos. 1.k, 23). In case of pond no. 7 during first year of the study period the hardness value was minimum i.e. 96.7 mg/l in November'98 and maximum i.e. 102 mg/l in March'99 (Fig. 21, Table nos. 1.k, 22), while in second year of the study period, it was minimum i.e. 99 mg/l in April'99 and was maximum i.e. 110 mg/l in October'99 (Fig. 21, Table nos. 1.k, 23).

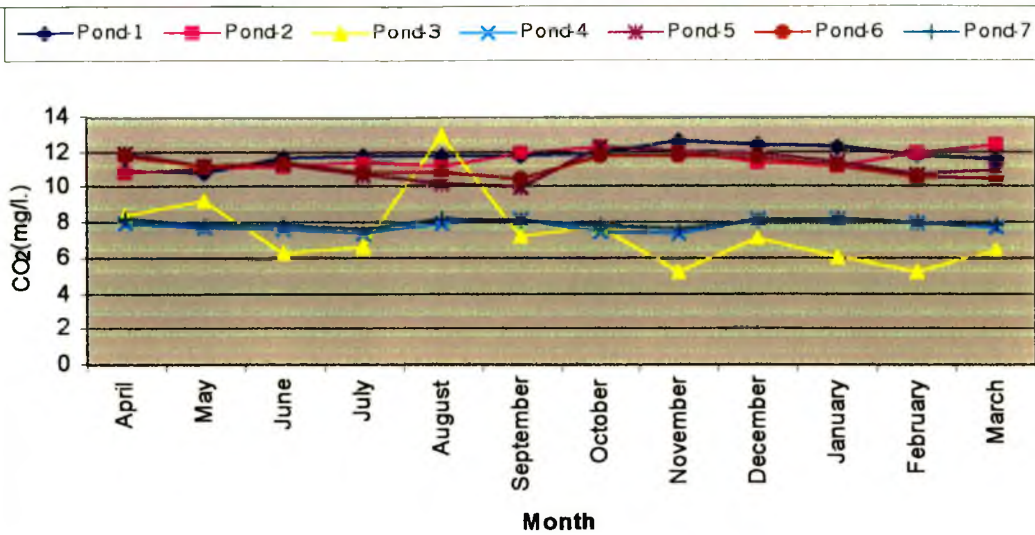


Fig-18 : Montly fluctuation of CO_2 of different ponds water during April '98-99

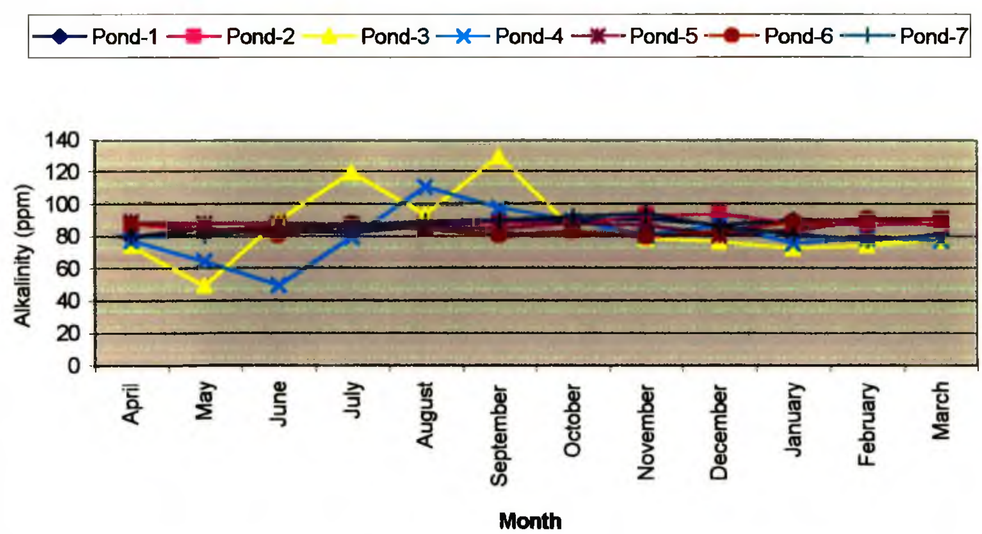


Fig-19 : Montly fluctuation of Alkalinity of different ponds water during April '98-March '99

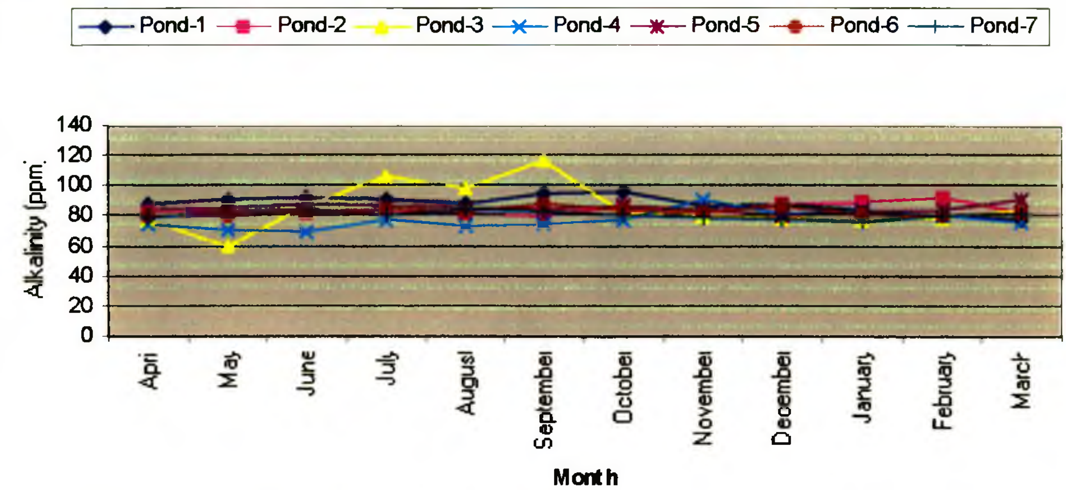


Fig-20 : Monthly fluctuation of Alkalinity of different ponds water during April '99-arch 2000

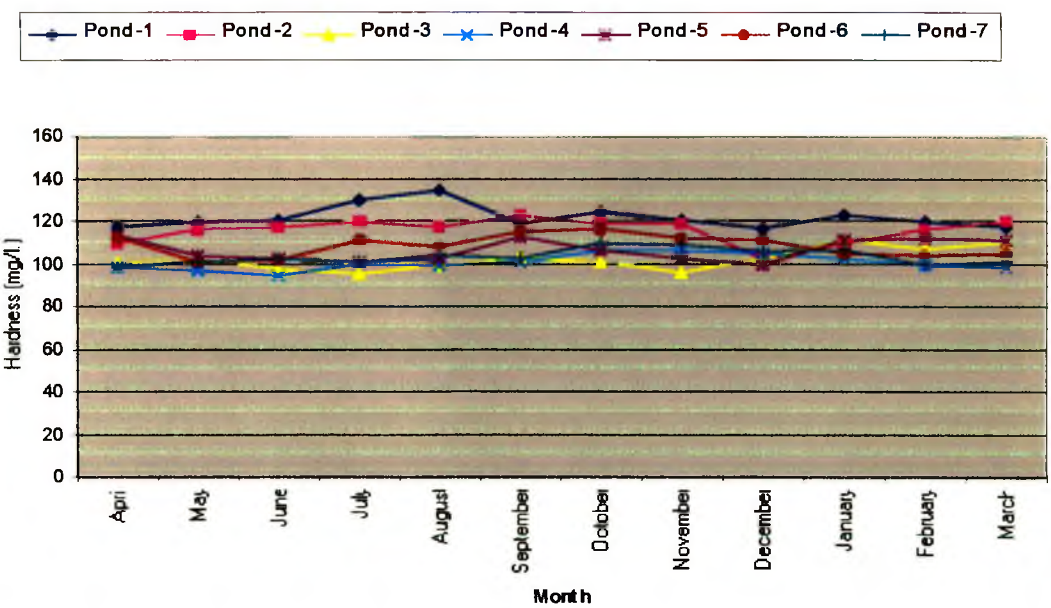


Fig-21 : Monthly fluctuation of Hardness of different ponds water during April '99-March-2000

3.3. PHYTOPLANKTON

Plankton at the present time was defined as free-floating animal and plant organism, whose intrinsic power of locomotion if present is so feeble that they remain almost at the mercy of currents and waves (Jhingran, 1985). Plankton population shows the productivity status of water body because they were the direct and basic source of food for most animals in aquatic habitate.

To interpret on primary productivity, qualitative and quantitative estimation of phytoplankton and primary productivity were measured in the present investigation. Phytoplankton members belonging to these groups usually remains suspended freely in the water with some small colonies.

In case of pond no. 1, the phytoplankton abundance was maximum in July'98 (i.e. 40503 individuals/l) and minimum in October'98 (i.e. 17305 individuals/l) with an average of 25002 individuals/l/month in the first year (Fig. 22, Table no. 52). In the second year it was maximum in July'99 (i.e. 32530 individuals/l) and minimum in October'99 (i.e. 14044 individuals/l) with an average of 20286 individuals/l/month (Fig. 23, Table-53). In the first year from April'98 the phytoplankton community expressed a increasing tendency in their number ultimately a peak abundance was in July'98 (i.e. 40503 individuals/l) and there after a brief decline in their population number through up to November'98 (i.e. 18567 individuals/l) and again increased gradually up to January'99 (i.e. 27605 individuals/l), again decline up to March'99 (i.e. 18105 individuals/l) (Fig. 22, Table-24, 25). In the second year, the phytoplanktonic community expressed a peak abundance in July'99 (i.e. 32530 individuals/l) then gradually declined in number up to October'99 (i.e. 14044 individuals/l) again it raised up to January, 2000 (i.e. 24121 individuals/l) and than declined, up to March, 2000 (i.e. 16068 individuals/l) (Fig. 23, Table-26, 27). The highest peak of phytoplanktonic abundance was in July'99 and the lowest in October'99.

In case of pond no. 2 during the first year (i.e. April'98-March'99), it was maximum in July'98 (i.e. 29433 individuals/l) and minimum in November'98 (i.e. 13505 individuals/l) and with an average of 19263 individuals/l/month (Fig. 24, Table-52). In the second year (i.e. April'99-March'2000), it was maximum in July'99 (i.e.26130 individuals/l) and minimum in November'99 (i.e. 11310 individuals/l), with an average of 17474 individuals/l/month (Fig. 25, Table-53). In the period April'98-March'99 the peak abundance of phytoplanktonic community was in July'98 (i.e. 29433 individuals/l) then gradually decreased up to November'98 (i.e. 13505 individuals/l) than again increased up to February'99 (i.e. 18111 individuals/l) and than decreased in March'99 (i.e. 13119 individuals/l) (Fig. 24, Table-32, 33). Similarly, in the period April'99-March, 2000 the phytoplanktonic peak abundance was in July'99 (i.e. 26130 individuals/l) and gradually decreased up to November'99 (i.e. 11310 individuals/l) and again increased up to February, 2000 (i.e. 16814 individuals/l) (Fig. 25, Table-34, 35).

Fig-22 : Percent occurrence of phytoplankton in pond-1 during April '98-March '99

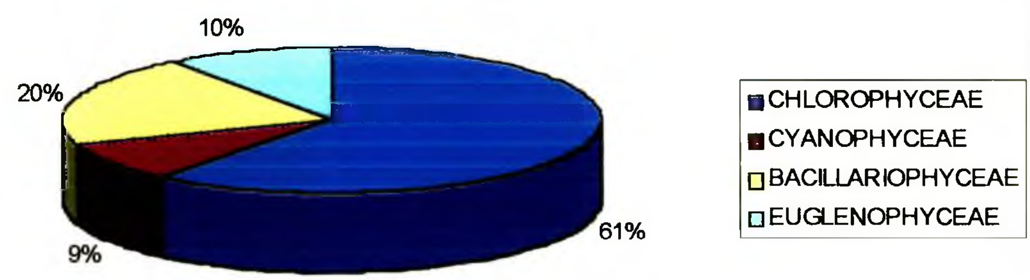


Fig-23 : Percent occurrence of phytoplankton in pond-1 during April '99-March, 2000

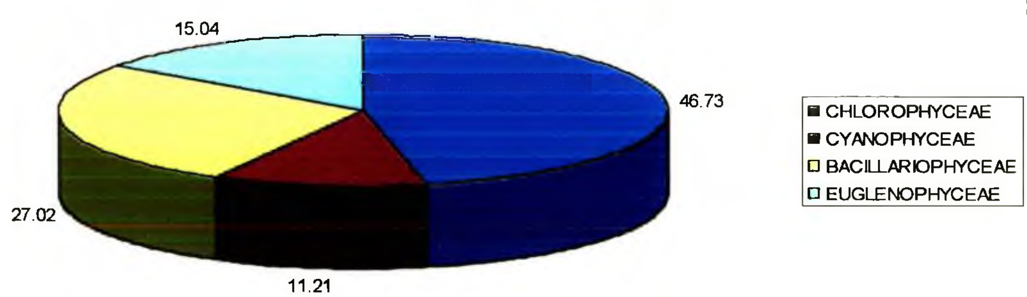


Fig-24 : Percent occurrence of Phytoplankton in pond-2 during April '98-March '99

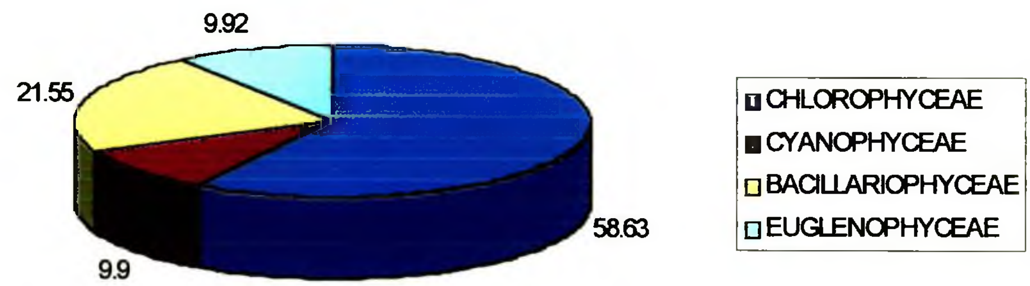


Fig-25 : Percent occurrence of Phytoplankton in pond-2 during April '99-March, 2000

In case of pond no. 3 during first year (i.e. April'98-March'99) it was maximum in June'98 (i.e. 73745 individuals/l) and minimum in March'99 (i.e. 26100 individuals/l) with an average of 47461 individuals/l/month (Fig. 26, Table-52). In the period April'99-March, 2000, it was maximum in July'99 (i.e. 67830 individuals/l) and minimum is October'99 (i.e. 29438 individuals/l) with an average of 47029 individuals/l/month (Fig. 27, Table-53).

In case of pond no. 4 during first year, (i.e. April'98-March'99) the phytoplanktonic abundance was maximum in August'98 (i.e. 70230 individuals/l) and minimum in November'98 (i.e. 22732 individuals/l) with an average of 41562 individuals/l/month (Fig. 28, Table-52). During second year, (i.e. April'99-March, 2000) the phytoplanktonic abundance was maximum (i.e. 7177 individuals/l) in April'99 and minimum (i.e. 2718 individuals/l) in August'99 and with an average of 5097 individuals/l/month (Fig. 29, Table-53).

In case of pond no. 5 during first year the phytoplanktonic abundance was maximum in July'98 (i.e. 70300 individuals/l) and minimum in October'98 (i.e. 24520 individuals/l) with an average of 44486 individuals/l/month (Fig. 30, Table-52). In second year, it was maximum in July'99 (i.e. 68210 individuals/l) and minimum in October'99 (i.e. 21532 individuals/l) with an average of 39418 individuals/l/month (Fig. 31, Table-53).

In case of pond no. 6 during the first year of the study preiod, it was maximum in September'98 (i.e. 65708 individuals/l) and minimum in October'98 (i.e. 20311 individuals/l) with an average of 40950 individuals/l/month (Fig. 32, Table-52). In second year it was maximum in June'99 (i.e. 67103 individuals/l) and minimum in October'99 (i.e. 18232 individuals/l), with an average of 40517 individuals/l/month (Fig. 33, Table-53).

In case of pond no. 7 during first year of of the study period, it was maximum in June'98 (i.e. 66018 individuals/l) and minimum (i.e. 21181 individuals/l) in November'98, with an average of 41671 individuals/l/month (Fig. 34, Table-52). In second year it was maximum in July'99 (i.e. 64337 individuals/l) and minimum (i.e. 28515 individuals/l) in March, 2000, with an average of 46955 individuals/l/month (Fig. 35, Table-53).

Fig-26 : Percent occurrence of Phytoplankton in pond-3 during April '98-March 99

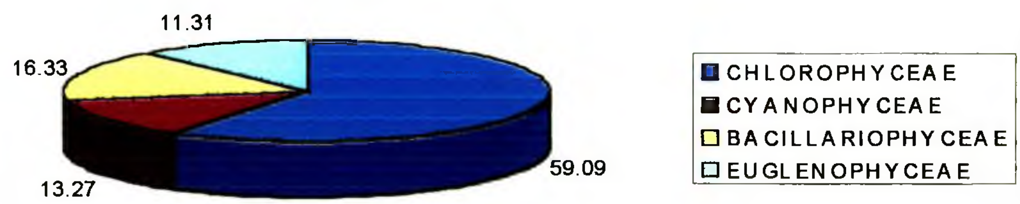


Fig-27 : Percent occurrence of Phytoplankton in pond-3 during April '99-March, 2000

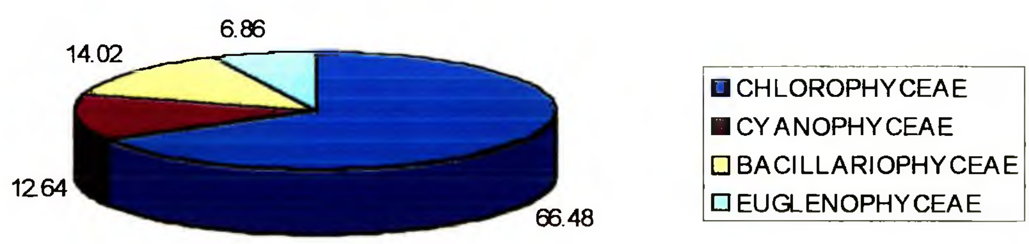


Fig-28 : Percent occurrence of Phytoplankton in pond-4 during April '98-March'99

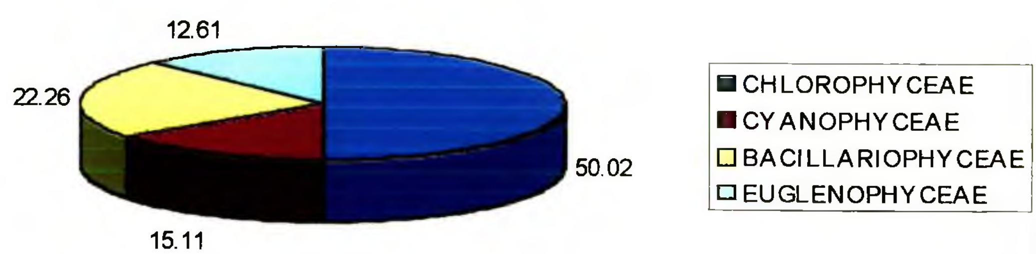


Fig-29 : Percent occurrence of Phytoplankton in pond-4 during April '99-March, 2002

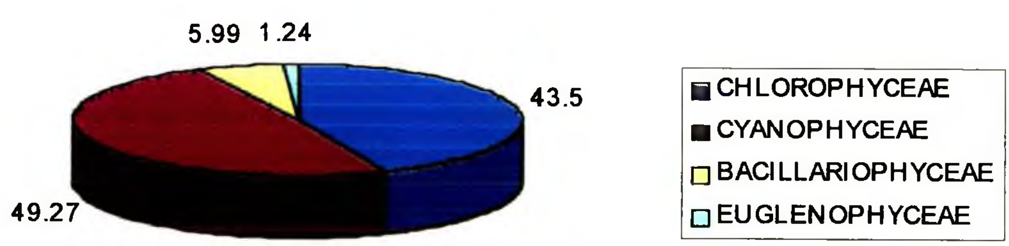


Fig-30 : Percent occurrence of Phytoplankton in pond-5 during April '98-March '99

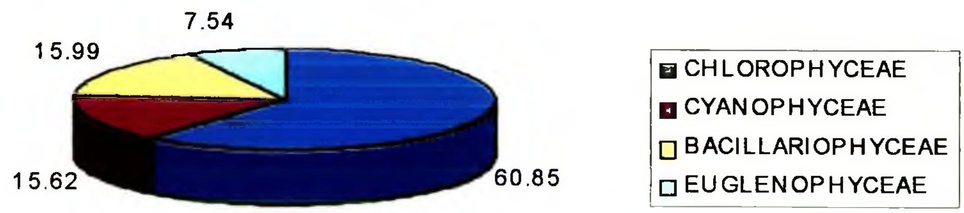


Fig-31 : Percent occurrence of Phytoplankton in pond-5 during April '99-March, 2000

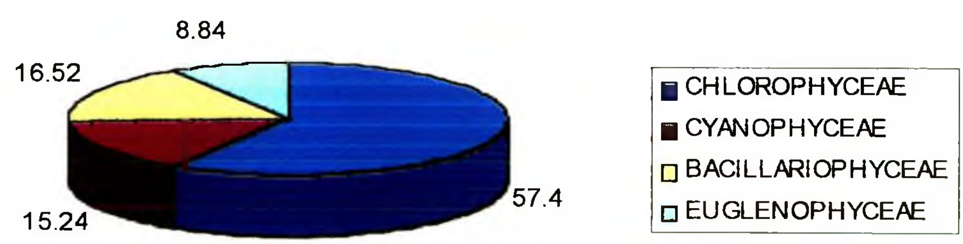


Fig-32 : Percent occurrence of Phytoplankton in pond-6 during April '98-March'99

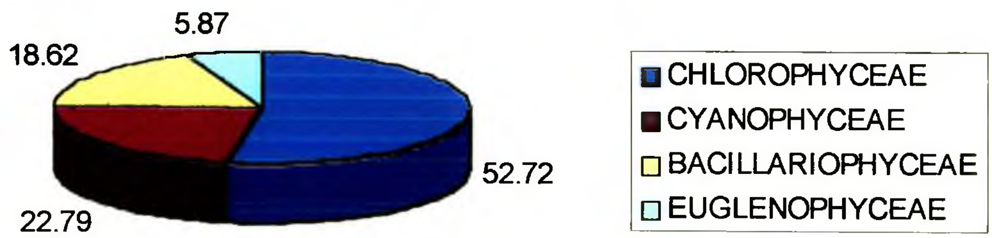
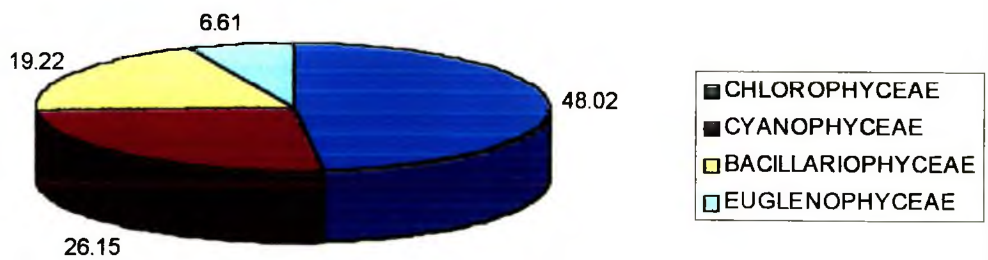


Fig-33 : Percent occurrence of Phytoplankton in pond-6 during April '99-March, 2000



Chlorophyceae

Chlorophyceae was noted to be the most dominant group of phytoplankton in the pond. By applying several feed samples there was a wide range of population fluctation (Table-54, 55) in different pond.

By applying feed sample 1 in pond nos. 1, 2 the population abundance of chlorophyceae in the first year was minimum (5236 individuals/l) in March'99 in pond no. 2 and maximum (14298 individuals/l) in June'98 in pond no. 1 (Table no. 54). In the second year it was minimum (4170 individuals/l) in November, 2000 in pond no. 2 and maximum (10900 individuals/l) in September'99 in pond no. 1 (Table no. 55). By applying feed sample 2 in pond nos. 3, 4 the population abundance of chlorophyceae in the first year was minimum (8374 individuals/l) in March'99 in pond no. 4 and maximum (30165 individuals/l) in July'98 in pond no. 3 (Table no. 54). In the second year it was minimum (3057 individuals/l) in March, 2000 in pond no. 4 and maximum (29081 individuals/l) in December'99 in pond no. 3 (Table no. 55). By applying feed sample 3 in pond nos. 5, 6 the population abundance of chlorophyceae in the first year was minimum (9618 individuals/l) in October'99 in pond no. 6 and maximum (29833 individuals/l) in July'98 in pond no. 5 (Table no. 54). In the second year it was minimum (5217 individuals/l) in March, 2000 in pond no. 6 and maximum (25799 individuals/l) in July'99 in pond no. 5 (Table no. 55). By applying feed sample 4 in pond nos. 7 the population abundance of chlorophyceae in the first year was minimum (5487 individuals/l) in March'99 and maximum (22894 individuals/l) in December'98 (Table no. 54). In the second year it was minimum (28515 individuals/l) in March, 2000 and maximum (64337 individuals/l) in July'99 (Table no. 55).

The quantification of phytoplankton was not based on genus or species, however, *Phacus* (Plate-35) *Chlorococcus* (Plate-36), *Scecedasmacae, Hydrodactylocaea* (Plate-37) etc. were observed frequently in the sample.

Cyanophyceae

Cyanophyceae was the second highest group of phytoplankton in the ponds. The population density of Cyanophyceae was highly variable and showed strong seasonal change. In two years research programme after the application of different feed samples the population abundance varied.

By applying feed sample 1 the monthly average number of Cyanophyceae during first year in pond nos.1, 2 was 6488 individuals/l, 4581 individuals/l respectively and in second year it was 5065 individuals/l, 4981 individuals/l respectively (Fig. 36, Table-56). By applying feed sample 2 the monthly average number of Cyanophyceae during first year in pond nos.3, 4 was 10568 individuals/l, 10550 individuals/l respectively and in second year it was 11367 individuals/l, 7896 individuals/l respectively (Table-56).

Fig-34 : Percent occurrence of Phytoplankton in pond-7 during April '98-March '99

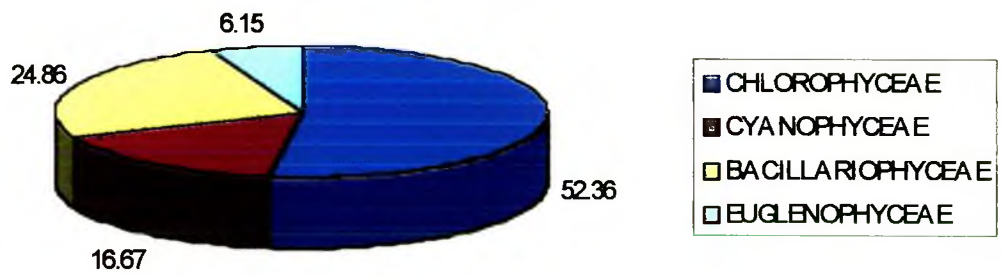
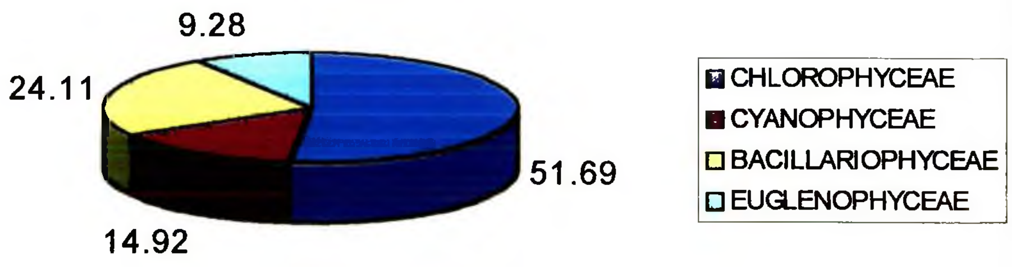


Fig-35 : Percent occurrence of Phytoplankton in pond-7 during April '99-March, 2000



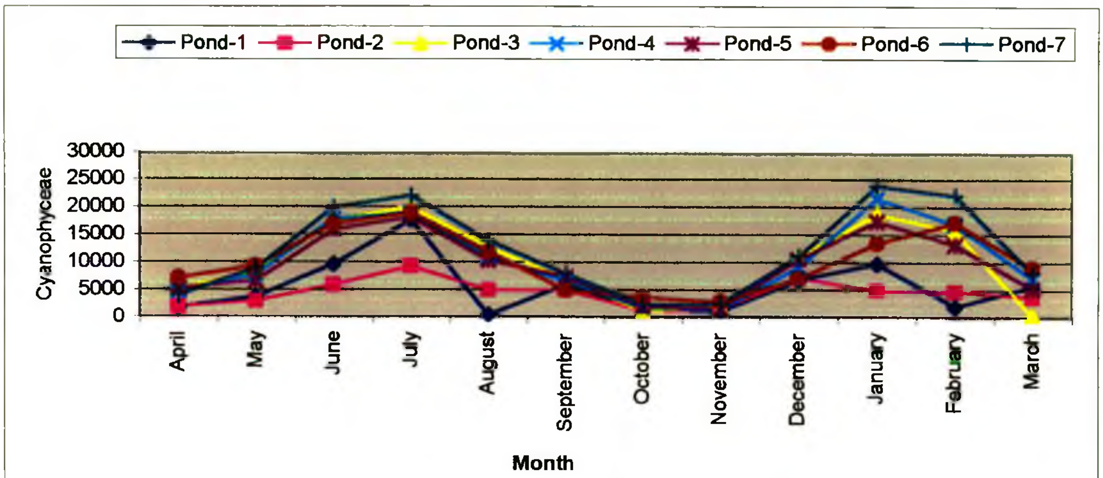


Fig-36 : Monthly fluctuation of Cyanophyceae in different ponds during April '98-March '99

By applying feed sample 3 the monthly average number of Cyanophyceae during first year in pond nos. 5, 6 was 9612 individuals/l, 10304 individuals/l respectively and in second year it was 8954 individuals/l, 11128 individuals/l respectively (Table-57). By applying feed sample 4 the monthly average number of Cyanophyceae during first year in pond no.7, was 12575 individuals/l and in second year it was 13502 individuals/l (Table-57).

The most commonly observed genera of Cyanophyceae was *Nostoc* (Plate-38), *Anabaena* (Plate-39).

Euglenophyceae

Euglenophyceae was also a dominant group of phytoplankton, which expressed seasonal changes in their abundance. In two years research programme by application of different feed samples the population number varied.

By applying feed sample 1 the monthly average number of Euglenophyceae, in the first year in case of pond nos. 1, 2 it was 2670 individuals/l, 1875 individuals/l respectively and in the second year it was 2484 individuals/l, 2501 individuals/l respectively (Table-58, 59). By applying feed sample 2 the monthly average number of Euglenophyceae, in the first year in case of pond nos. 3, 4 it was 5845 individuals/l, 5464 individuals/l respectively and in second year these was 4382 individuals/l, 4082 individuals/l respectively (Table-58, 59). By applying feed sample 3 the monthly average number of Euglenophyceae and in first year in case of pond nos. 5, 6 it was 6437 individuals/l, 6450 individuals/l respectively and in second year it was 5723 individuals/l, 7496 individuals/l respectively (Table-58, 59). By applying feed sample 4 the monthly average number of Euglenophyceae in the first year in case of pond-7 it was 5793 individuals/l and in second year it was 6577 individuals/l (Table-58, 59).

The most commonly observed genera of Euglenophyceae was *Euglena* (Plate-42), *Lepocinclis* (Plate-43)

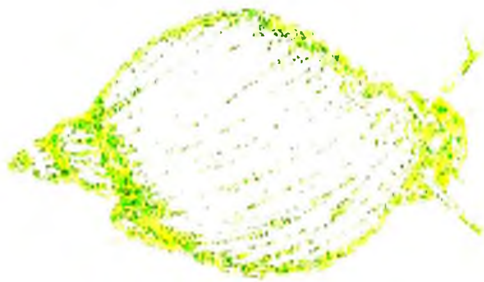


Plate-33 : Lymnea

Plate-34 : Lamellidens

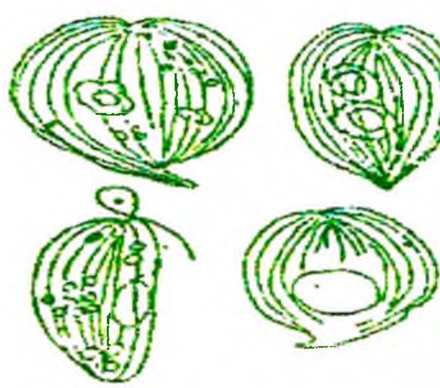


Plate-35 : Phacus

Plate-36 : Chlorococcus

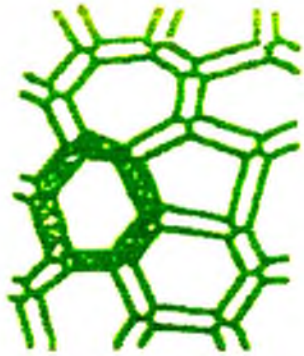


Plate-37 : Hydrodictyon

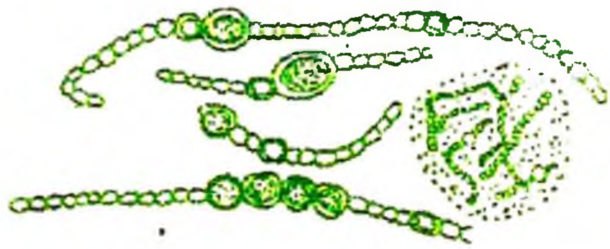


Plate-38 : Nostoc

Plate-39 : Anabaena

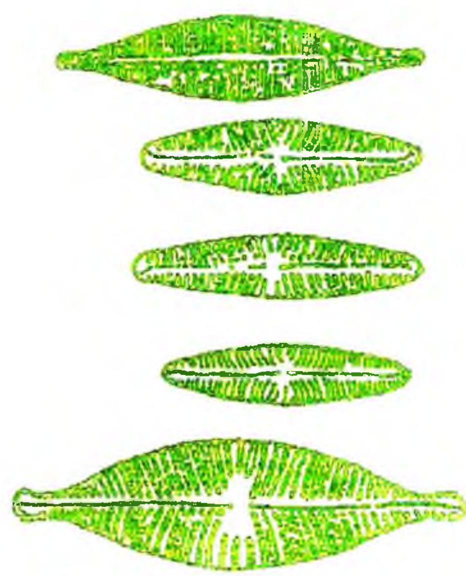


Plate-40 : Navicula

Plate-41 : Fragilaria

Plate-42 : Euglena

Plate-43 : Lepocinclis

Plate-44 : Brachionus

Bacillariophyceae

Bacillariophyceae was also one of the important group of phytoplankton. In two years research programme by the application of different feed samples the population number varied.

By applying feed sample 1 the monthly average number of Bacillariophyceae in first year in case of pond nos-1, 2 it was 5163 individuals/l, and 3694 individuals/l respectively and in second year it was 4032 individuals/l, 4104 individuals/l respectively (Table-60, 61). By applying feed sample 2 the monthly average number of Bacillariophyceae in first year in case of pond nos. 3, 4 it was 5845 individuals/l, 8085 individuals/l, and in second year it was 9181 individuals/l, 4104 individuals/l respectively (Table-60, 61). By applying feed sample 3 the monthly average number of Bacillariophyceae in first year in case of pond nos. 5, 6 it was 7221 individuals/l, 8139 individuals/l and in second year it was 6915 individuals/l, 8973 individuals/l respectively (Table-60, 61). By applying feed sample 4 the monthly average number of Bacillariophyceae in first year in case of pond-7 it was 9934 individuals/l and in second year it was 10964 individuals/l (Table-60, 61).

The major Bacillariophyte was mainly represented by *Navicula* (Plate-40), *Fragilaria* (Plate-41) *and Synedra* etc.

3.4. ZOOPLANKTON

In the research study qualitative and quantitative observations was made on monthly basis in different ponds. The major groups of zooplankton recorded during the course of the study was ranked on the basis of dominancy i.e. Rotifera > Copepoda > Cladocera > Protozoa > Nauplius > Ostracoda > Other miscellaneous group.

By applying feed sample 1 in pond nos. 1, 2 the monthly average population abundance in the first year was 10494 individuals/l/month and 10319 individuals/l/month respectively. In second year it was 9503 individuals/l/month and 9333 individuals/l/month respectively (Figs. 37-45, Table-1.p, Table-62 to 69).

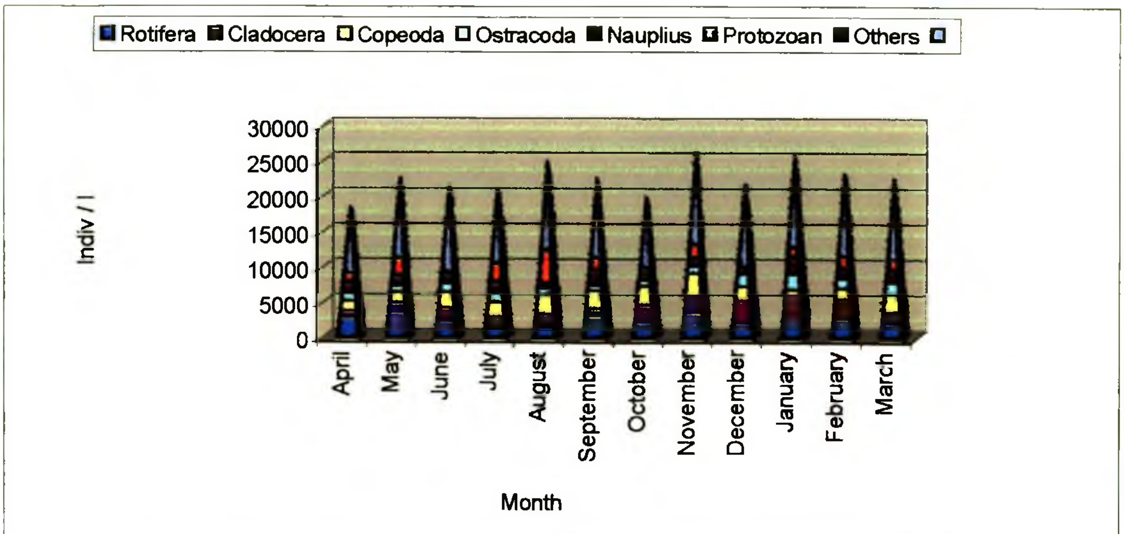


Fig-37 : Monthly abundance of Zooplankton in pond-1 in the period of April '98-March '99

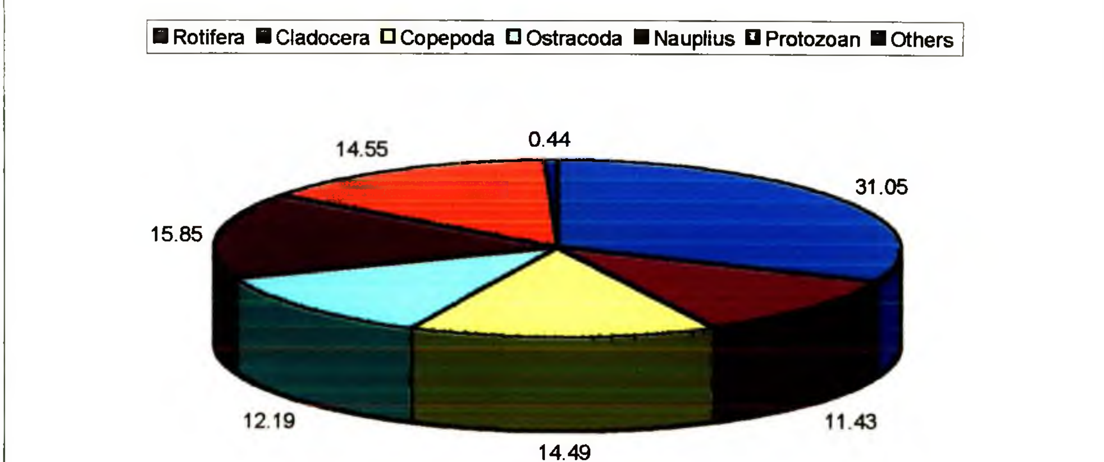


Fig-38 : Percentage of Zooplankton in pond-1 during April '98

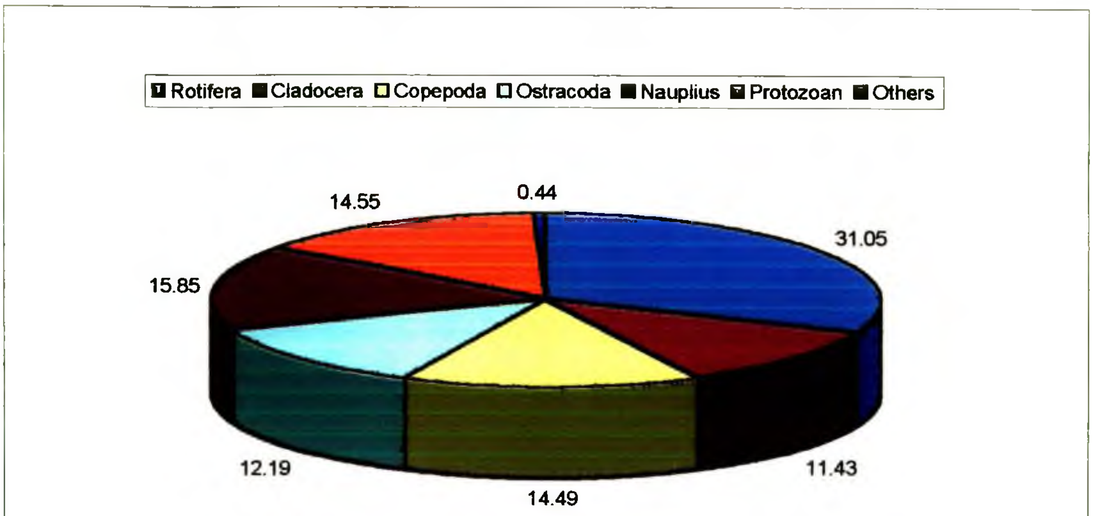


Fig-39 : Percentage of Zooplankton in pond-1 during April '98

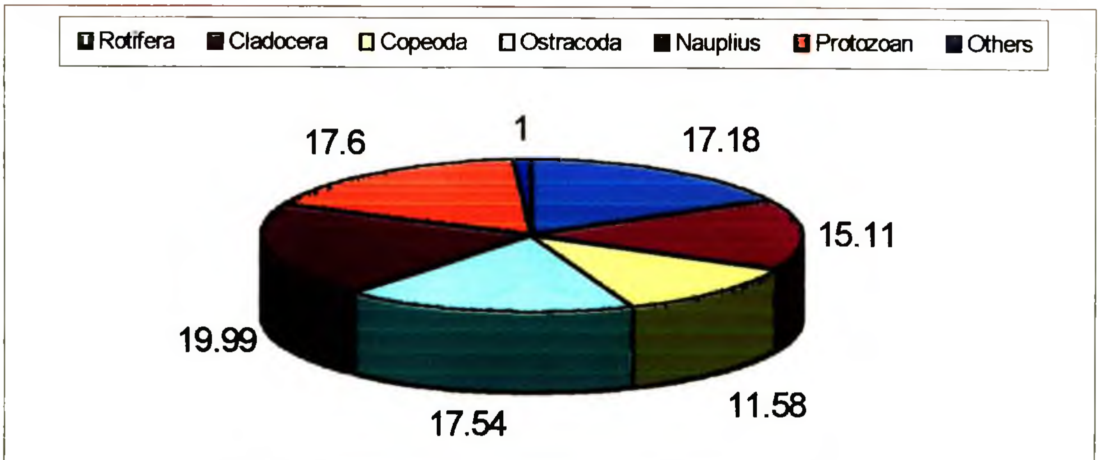


Fig-40 : Percentage of Zooplankton in pond-1 during April '99

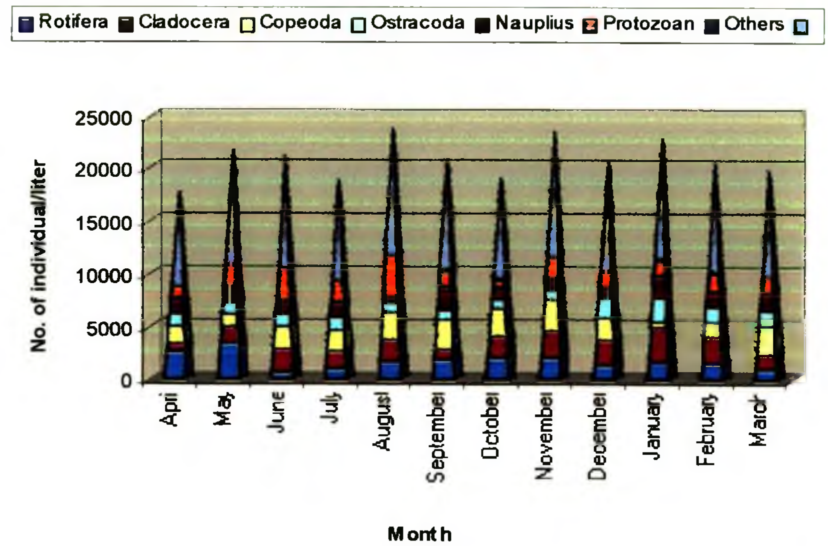


Fig-41 : Montly abundance of Zooplanktonin pond-2 during April '98-March '99

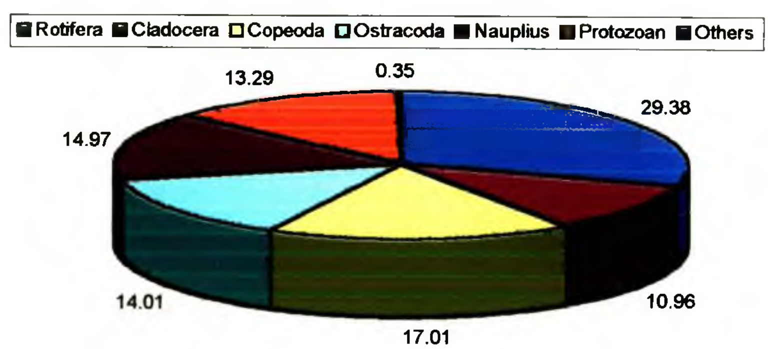


Fig-42 : Percentage of Zooplankton in pond-2 during April '98

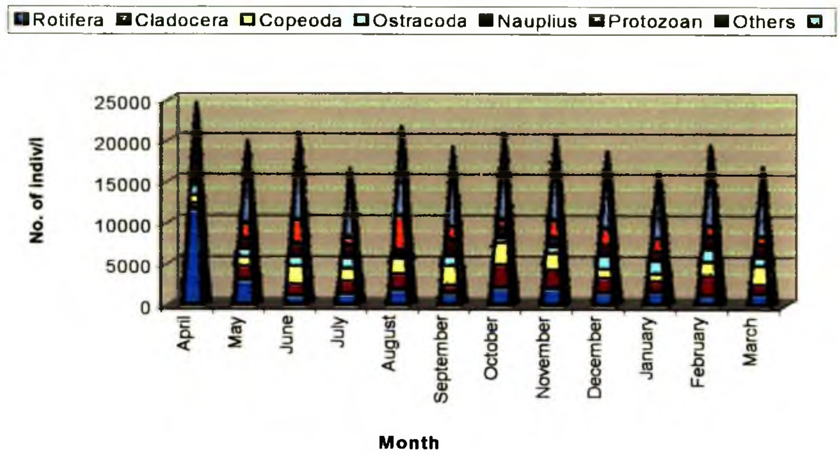


Fig-43 : Monthly abundance of Zooplankton in pond-2 during April '99-March, 2000

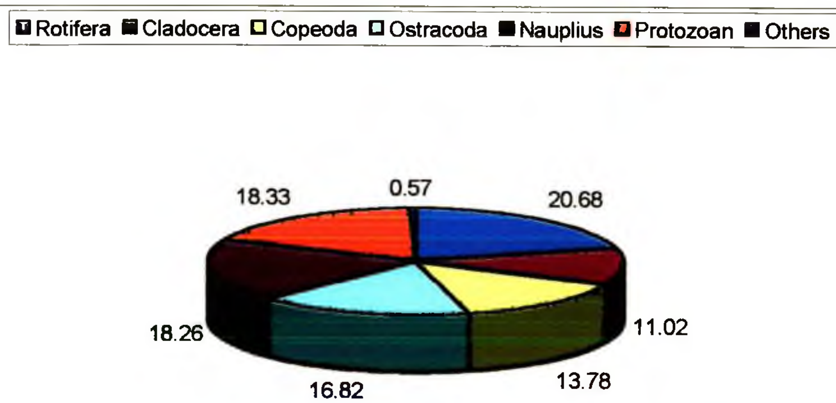


Fig-44 : Percentage of Zooplankton in pond-2 during April '99

By applying feed sample 2 in pond nos. 3, 4 in the first year the monthly average population abundance was 17913 individuals/l/month, 15010 individuals/l/month respectively and in second year it was 20384 individuals/l/month, 15495 individuals/l/month respectively (Figs. 46-53, Table-1.p, Table-70 to 77). By applying feed sample 3 in pond nos. 5, 6 in the first year the monthly average population abundance was 15495 individuals/l/month, 12533 individuals/l/month respectively and in second year it was 17074 individuals/l/month, 14287 individuals/l/month respectively (Figs. 54-61, Table-1.p, Table-78 to 85). By applying feed sample 4 in pond no. 7 in the first year the monthly average population abundance was 16914 individuals/l/month and in second year it was 19468 individuals/l/month, (Figs. 62-64, Table-1.p, Table-86 to 89).

The detailed results are described below.

Rotifera

Rotifera was the most dominant group of zooplanktons that observed in several ponds. In case of pond no. 1 in the year April'98-March'99 it was maximum in May'98 (Table-90) i.e. 33.24% (Table-91) and was minimum in July'98 (Table-90) i.e. 12.77% (Table-91). Similarly, in the year April'99-March'2000, it was maximum in May'99 (Figs. 65-66, Table-92) i.e. 24.16% (Table-93) and minimum in April'99 (Table-92) i.e. 17.18% (Table-93). In case of pond no. 2 in the year April'98-March'99 it was maximum in May'98 (Table-90) i.e. 32.1% (Table-91) and was minimum in June'98 (Table-90) i.e. 6.98% (Table-91). Similarly, in the year April'99-March, 2000 it was maximum in May'99 (Figs. 65-66, Table-92) i.e. 30.65% (Table-93) and minimum in June'99 (Table-92) i.e. 10.83% (Table-93). In case of pond no. 3 in the year April'98-March'99 it was maximum in February'99 (Table-90) i.e. 43.02% (Table-91) and was minimum in June'98 (Table-90) i.e. 17.68% (Table-91). Similarly, in the year April'99-March, 2000 it was maximum in November'99 (Figs. 65-66, Table-92) i.e. 38.13% (Table-93) and minimum in September'99 (Table-92) i.e. 18.30% (Table-93). In case of pond no. 4 in the year April'98-March'99 it was maximum in February'99 (Table-90) i.e. 29.53% (Table-91) and was minimum in August'98 (Table-90) i.e. 15.89% (Table-91). Similarly, in the year April'99-March, 2000 it was maximum in November'99 (Figs. 65-66, Table-92) i.e. 38.57% (Table-93) and minimum in June'99 (Table-92) i.e. 14.70% (Table-93). In case of pond no. 5 in the year April'98-March'99 it was maximum in November'98 (Table-90) i.e. 46.78% (Table-91) and was minimum in September'98 (Table-90) i.e. 17.23% (Table-91). Similarly, in the year April'99-March, 2000 it was maximum in November'99 (Figs. 65-66, Table-92) i.e. 42.12% (Table-93) and minimum in June'99 (Table-92) i.e. 10.93% (Table-93). In case of pond no. 6 in the year April'98-March'99 it was maximum in November'98 (Table-90) i.e. 46.95% (Table-91) and was minimum in March'99 (Table-90) i.e. 19.37% (Table-91). Similarly, in the year April'99-March, 2000 it was maximum in August'99 (Figs. 65-66, Table-92) i.e. 36.92% (Table-93) and minimum in December'99 (Table-92) i.e. 13.26% (Table-93). In case of pond no. 7 in the year April'98-March'99 it was maximum in November'98 (Table-90) i.e. 32.36% (Table-91) and was minimum in December'98 (Table-90) i.e. 9.76% (Table-91). Similarly, in the year April'99-March, 2000 it was maximum in April'99 (Figs. 65-66, Table-92) i.e. 27.18% (Table-93) and minimum in December'99 (Table-92) i.e. 15.67% (Table-93).

By applying four feed samples in different ponds in the year April'98-March'99 the comparative highest abundance of Rotifera was found in pond no. 5 in November'98 (Table-90) i.e. 46.78% (Table-91) where feed sample-3 was applied. In that period the minimum abundance was in pond no. 2 in June'98 (Table-90) i.e. 6.98% (Table-91) where feed sample-1 was applied. Similarly, in the study period from April'99-March, 2000 the maximum abundance of Rotifera was in pond no. 5 in November'99 (Table-92) i.e. 42.12% (Table-93) and minimum in pond no. 2 in February, 2000 (Table-92) i.e. 12.50% (Table-93).

The Rotifers were represented by 11 genera. These were as follows:

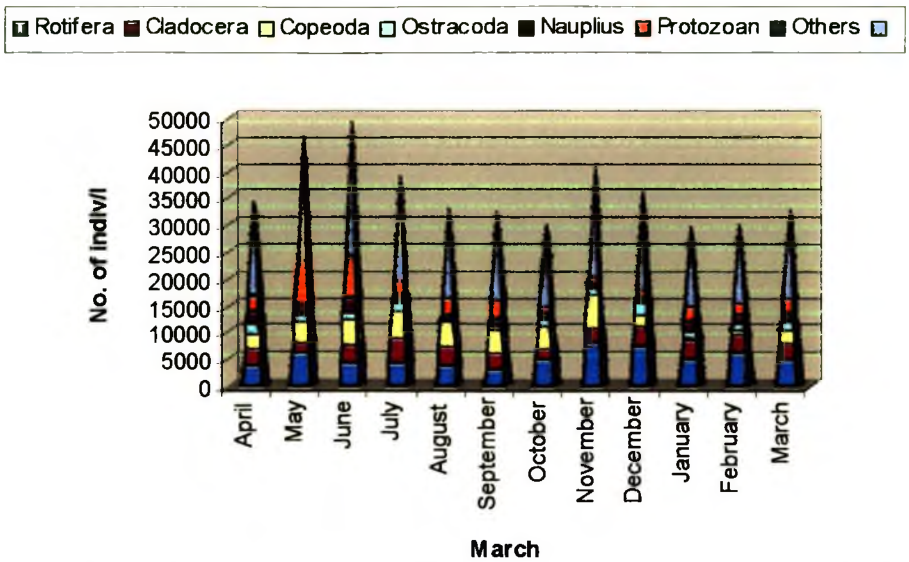


Fig-45 : Monthly abundance of Zooplankton in pond-3 during April '98-March '99

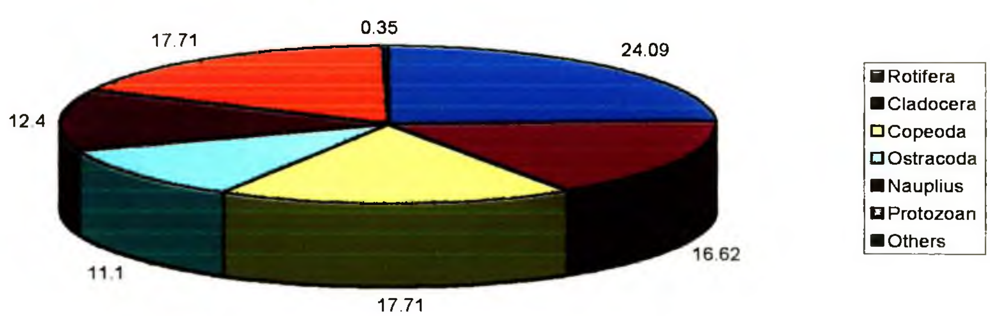


Fig-46 : Percentage of Zooplankton in pond-3 during April '98

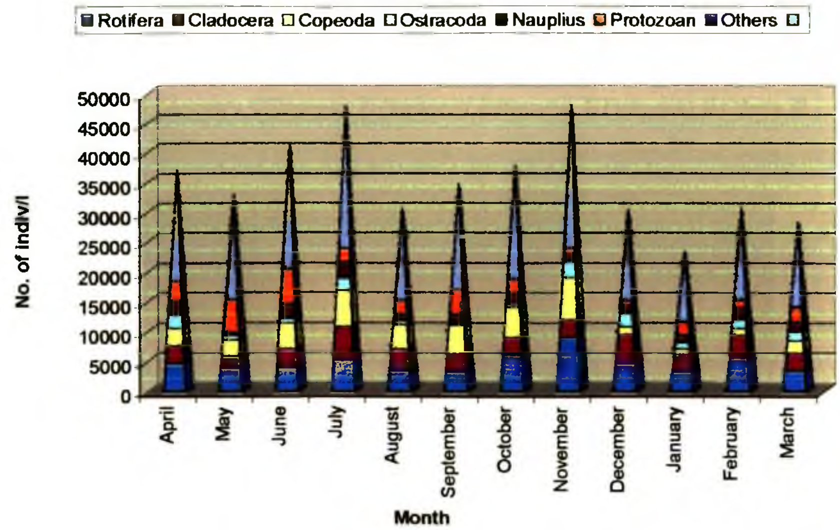


Fig-47 : Monthly abundance of Zooplankton in pond-3 during April '99-March, 2000.

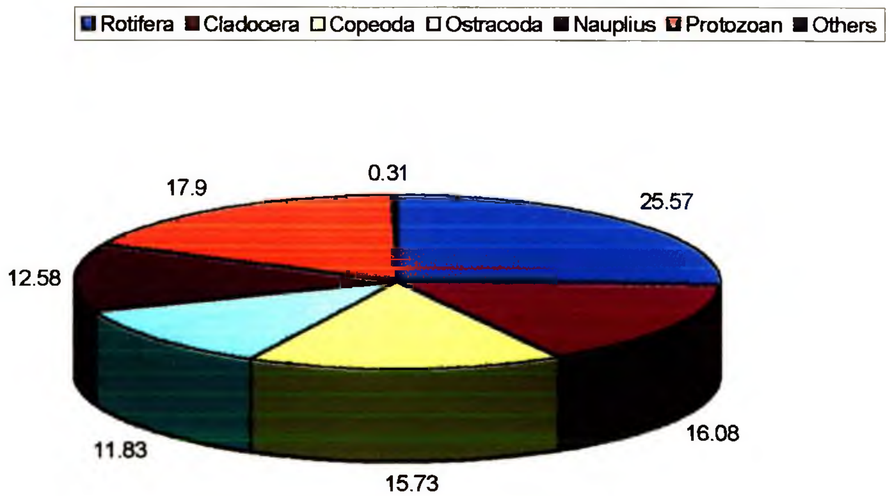


Fig-48 : Percentage of Zooplankton in pond-3 during April '99

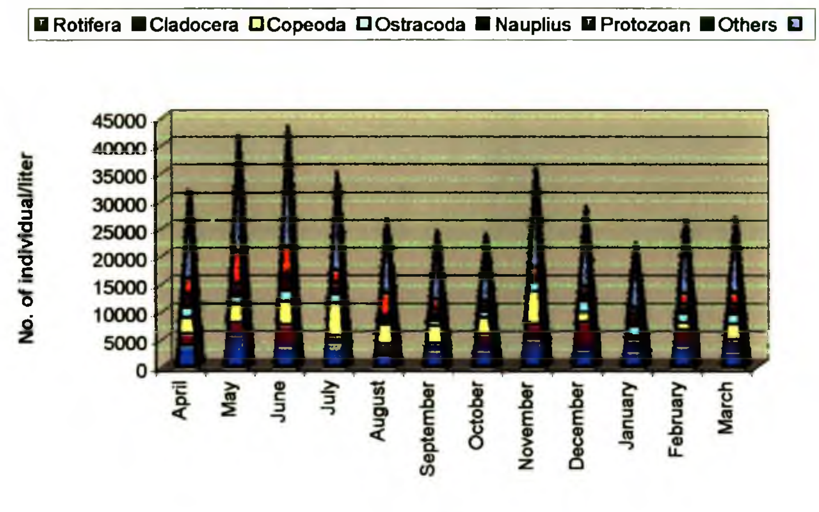


Fig-49 : Monthly abundance of Zooplankton in pond-4 April '98-March '99.

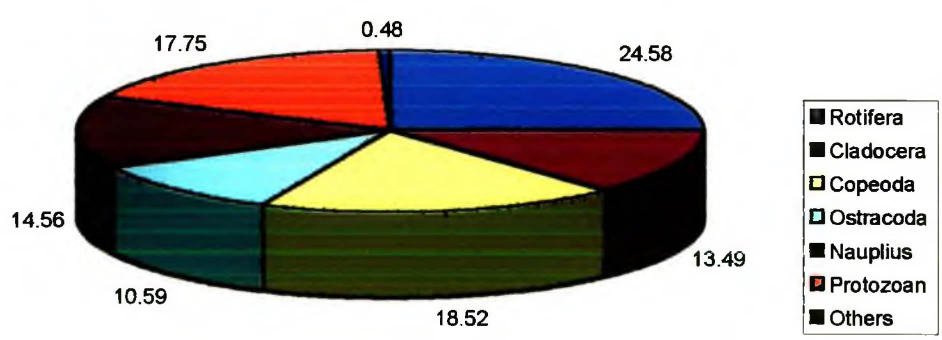


Fig-50 : Percentage of Zooplankton in pond-4 during April '98

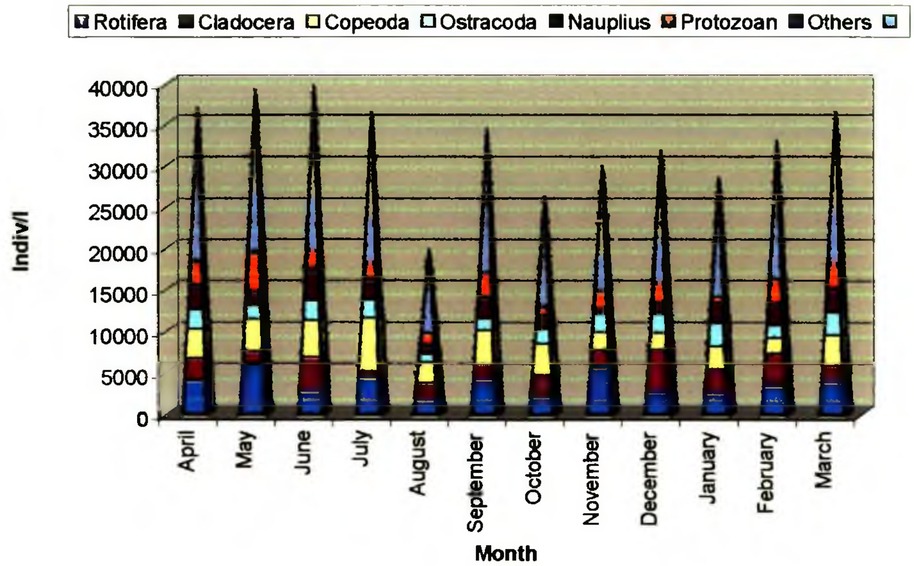


Fig-51 : Monthly abundance of Zooplankton in pond-4 during April '99-March,2000

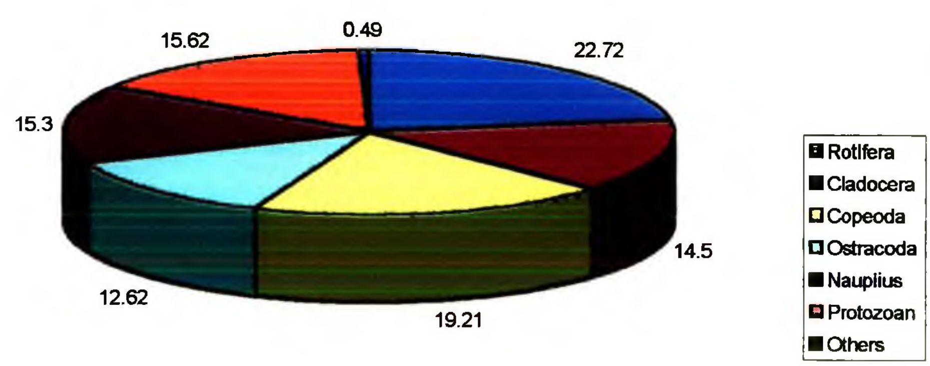


Fig-52 : Percentage of Zooplankton in pond-4 during April '99

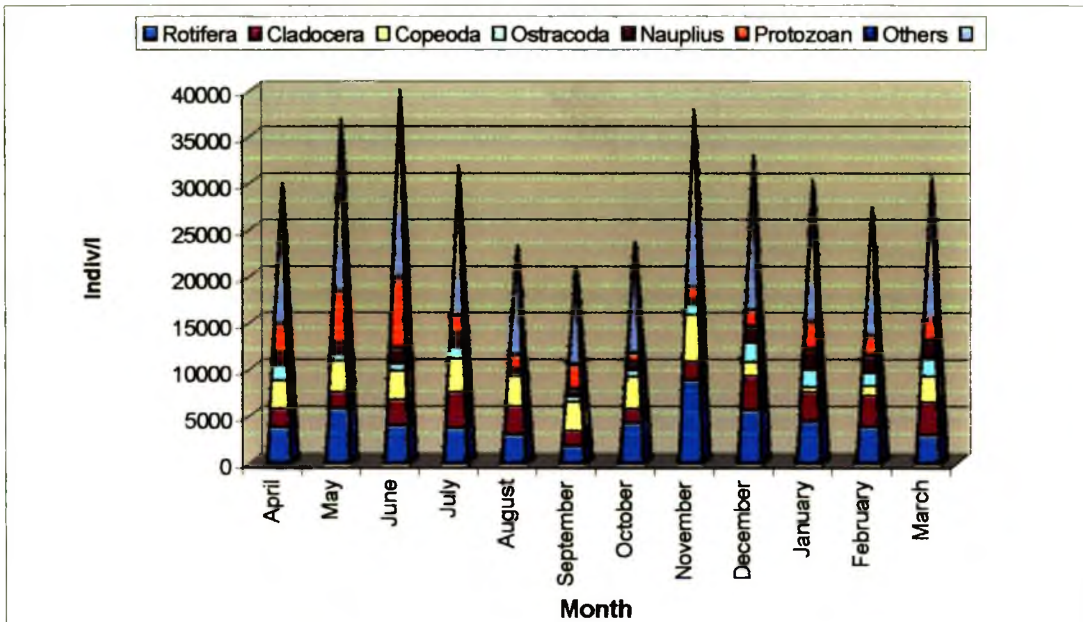


Fig-53 : Monthly abundance of Zooplankton in pond-5 during April '98-March '99

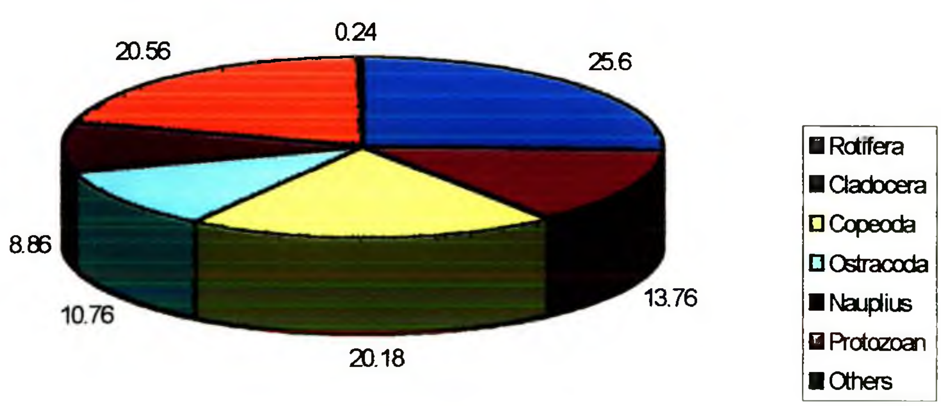


Fig-54 : Percentage of Zooplankton in pond-5 during April '98

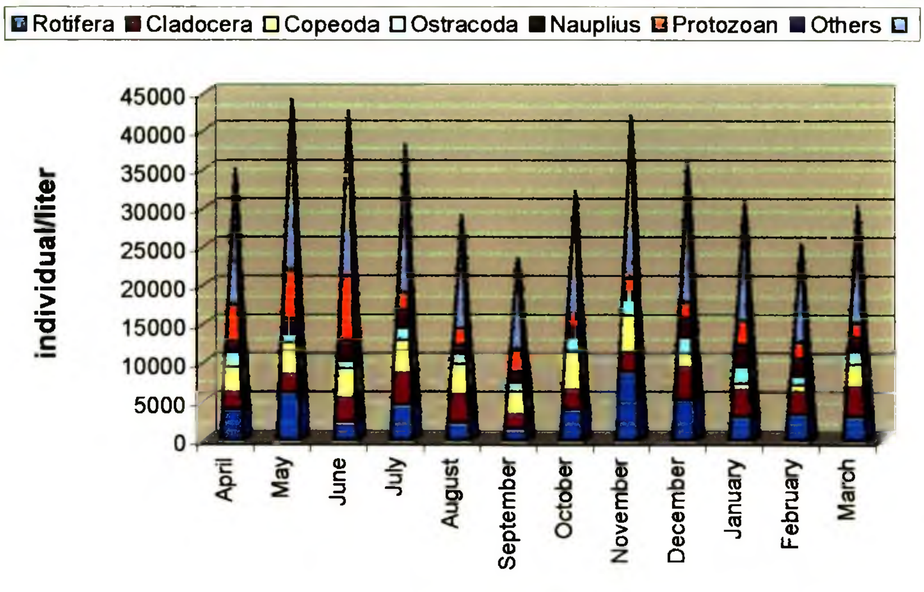


Fig-55 : Montly abundance of Zooplankton in pond-5 during April '99-March, 2000

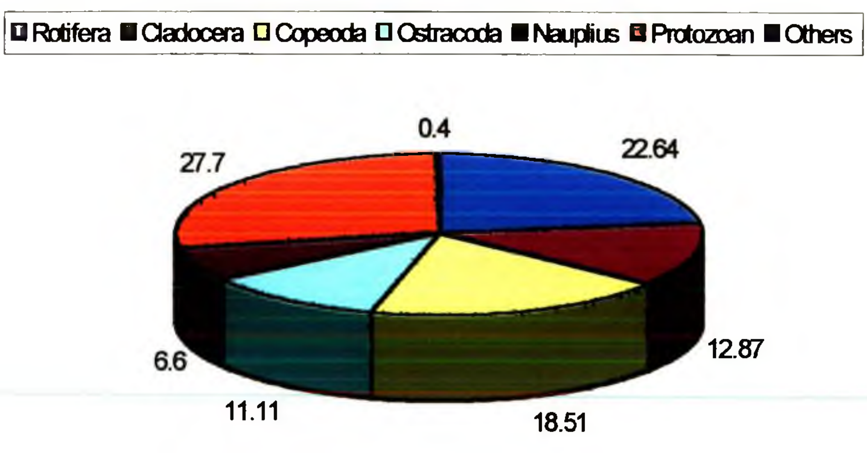


Fig-56 : Percentage of Zooplankton in pond-5 during April '99

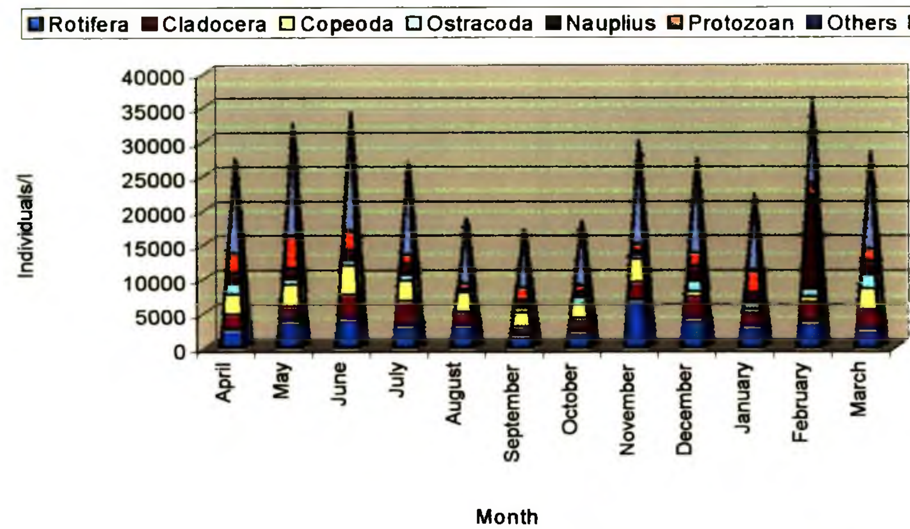


Fig-57 : Monthly abundance of Zooplankton in pond-6 during April '98-March '99

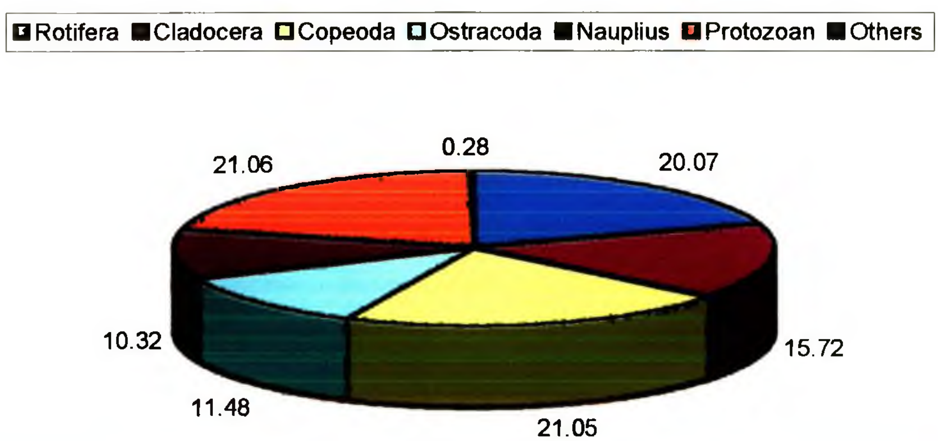


Fig-58 : Percetage of Zooplankton in pond-6 during April '98

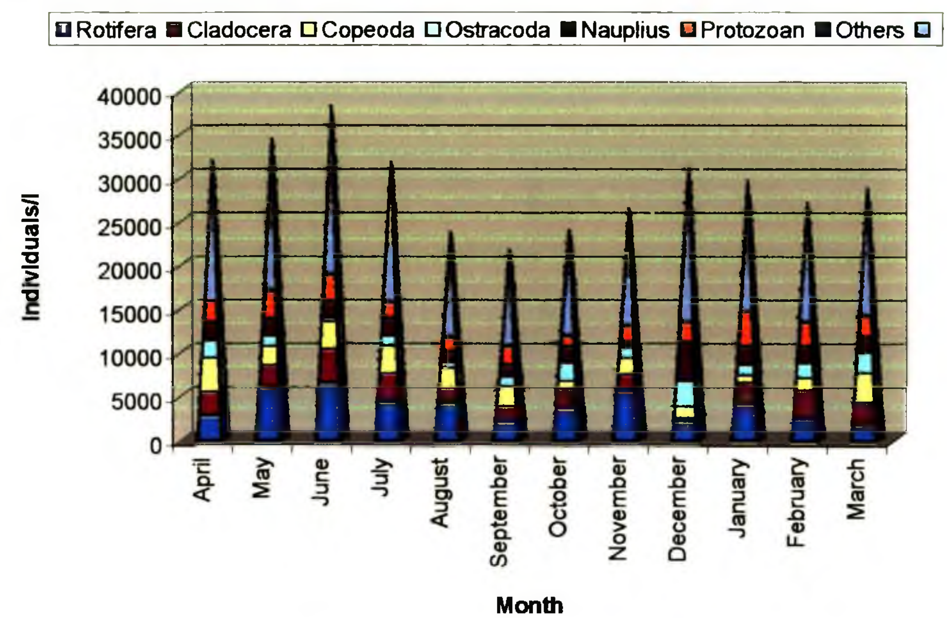


Fig-59 : Monthly abundance of Zooplankton in pond-6 during April '99-March 2000

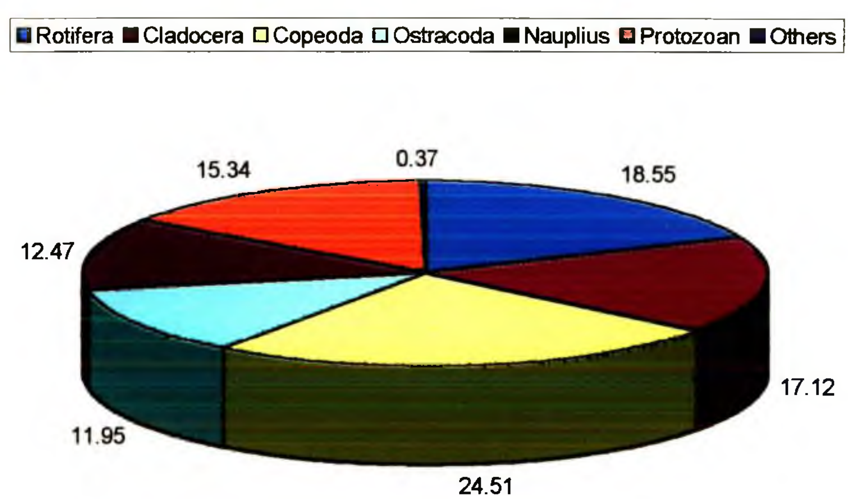


Fig-60 : Percetage of Zooplankton in pond-6 during April '99

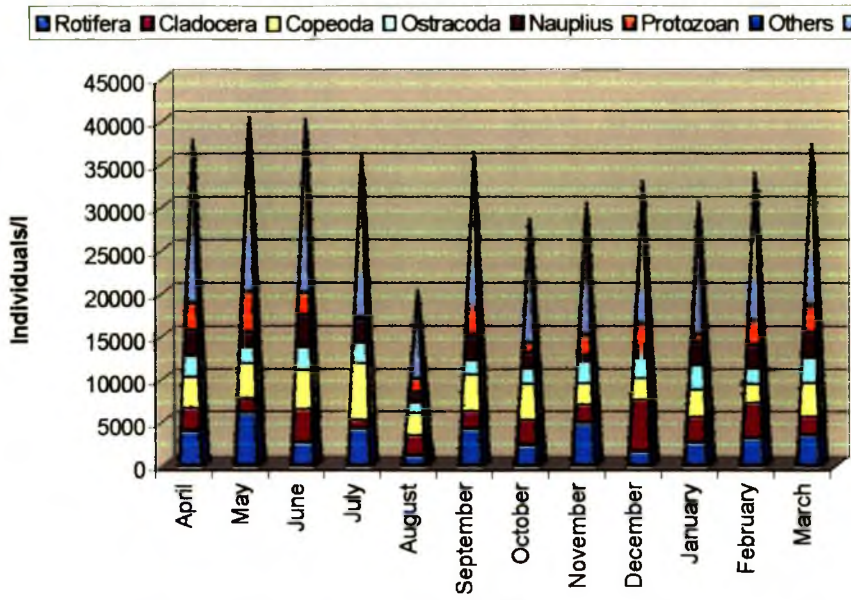


Fig-61: Monthly abundance of Zooplanktion in pond-7 during April'98-March'99

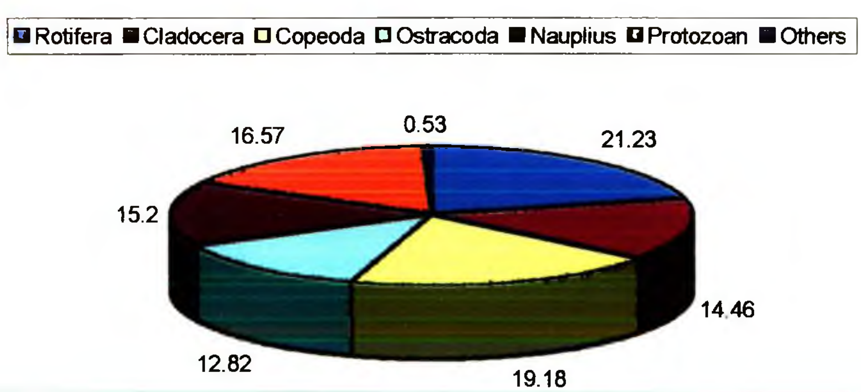


Fig-62 : Percentage of Zooplankton in pond-7 during April '98

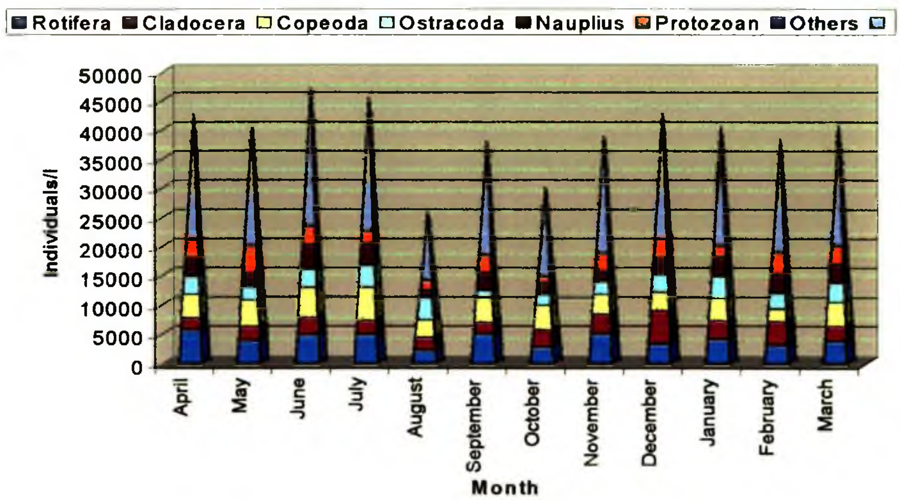


Fig-63 : Monthly abundance of Zooplankton in pond-7 during April '99-March, 2000.

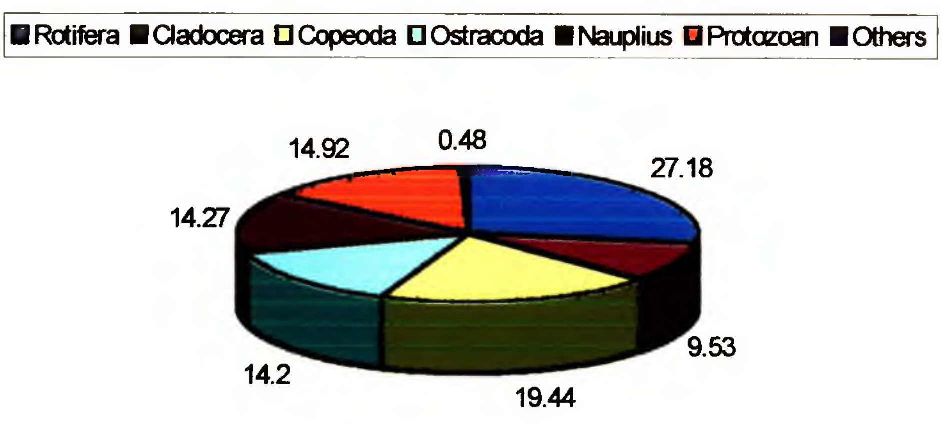


Fig-64 : Percentage of Zooplankton in pond-7 during April '99

Keratella (Plate-45)

It was one of the dominant group of Rotifera during April'98-March'99 the maximum abundance was (Table-94) in case of pond no. 1 in February'99, pond no. 2 in February'99, pond no. 3 in February'99, pond no. 4 in November'98, pond no. 5 in December'98, pond no. 6 in November'98 and pond no. 7 in May'98. And the minimum abundance was in (Table-94) pond no. 1 in July'98, pond no. 2 in June'98, pond no. 3 in June'98, pond no. 4 in January'99, pond no. 5 in September'99, pond no. 6 in April'98 and pond no. 7 in August'98. Similarly, in the study period from April'99-March, 2000 the maximum abundance was (Table-95) in case of pond no. 1 in February, 2000, pond no. 2 in March, 2000, pond no. 3 in November'99, pond no. 4 in March'99, pond no. 5 in November'99, pond no. 6 in November'99 and pond no. 7 in April'99. And the minimum abundance (Table-95) was pond no. 1 in July'99, pond no. 2 in July'99, pond no. 3 in September'99, pond no. 4 in August'99, pond no. 5 in September'99, pond no. 6 in March,2000 and pond no. 7 in August'99.

Filina (Plate-46)

During the work from April'98-March'99, the maximum abundance (Figs. 67-68, Table-96) was in case of pond no. 1 in June'98, pond no. 2 in August'98, pond no. 3 in June'98, pond no. 4 in November'98, pond no. 5 in November'98, pond no. 6 in November'98 and pond no. 7 in March'98. And the minimum abundance (Figs. 67-68, Table-96) was in case of pond no. 1 in March'99, pond no. 2 in March'99, pond no. 3 in March'99, pond no. 4 in March'99, pond no. 5 in March'99, pond no. 6 in April'98 and pond no. 7 in August'98. Similarly, in the study period from April'99-March,2000 the maximum abundance (Table-97) was in case of pond no. 1 in June'99, pond no. 2 in August'99, pond no. 3 in November'99, pond no. 4 in June'99, pond no. 5 in May'99, pond no. 6 in June'99 and pond no. 7 in April'99. And the minimum abundance (Table-97) was in case of pond no. 1 in February,2000, pond no. 2 in February,2000, pond no. 3 in September'99, pond no. 4 in January,2000, pond no. 5 in September'99, pond no. 6 in December'99 and pond no. 7 in August'99.

Trichocera (Plate-47)

During the work from April'98-March'99 the maximum abundance (Figs. 69, 70, Table-98) was in case of pond no. 1 in June'98, pond no. 2 in March'98, pond no. 3 in March'98, pond no. 4 in October'98, pond no. 5 in November'98, pond no. 6 in November'98, pond no. 7 in November'98.

Plate-45 : Keratella

Plate-46 : Filina

Plate-47 : Trichochera

Plate-48 : Notholca

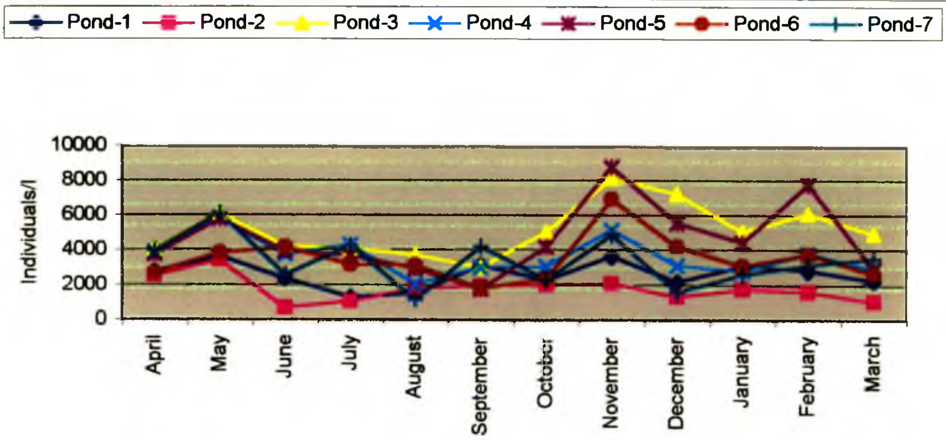


Fig-65 : Monthly abundance of Rotifera in different ponds during April '98-March '99

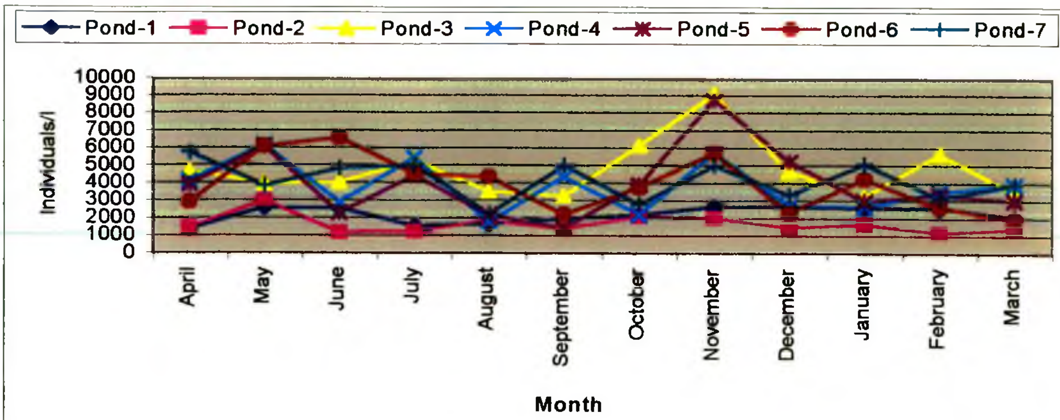


Fig-66 : Monthly abundance of Rotifera in different ponds during April '99-March, 2000

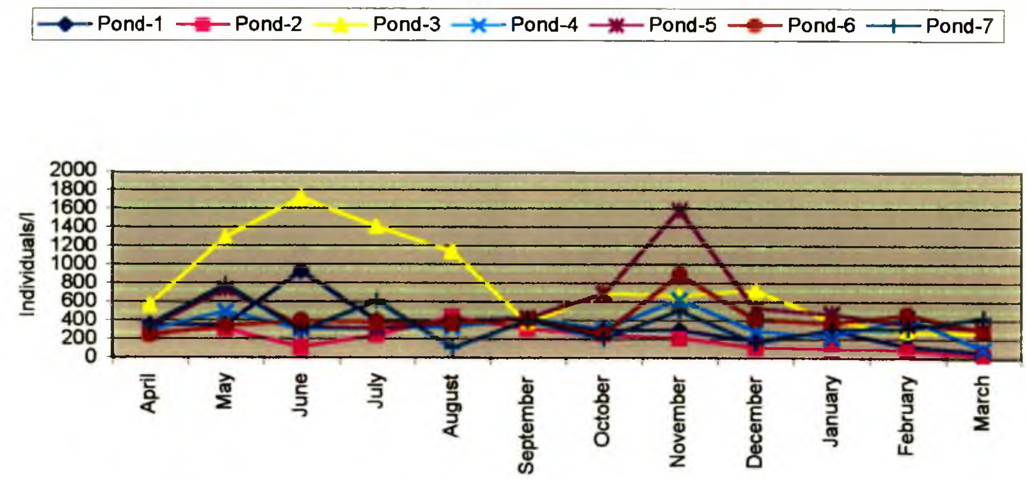


Fig-67 : Monthly abundance of *Filina* in different ponds during April '98-March 99

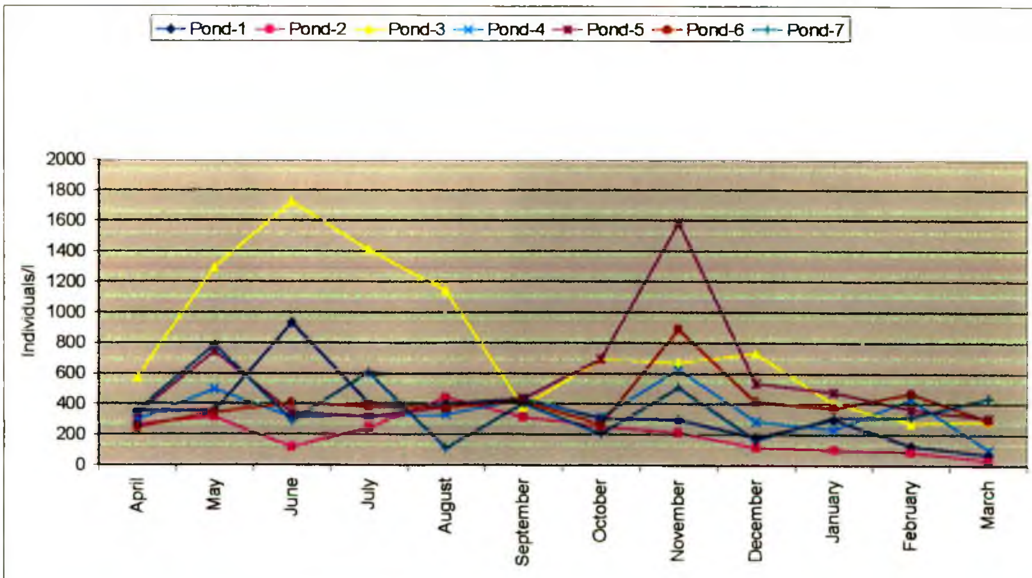


Fig-68 : Monthly abundance of *Filina* in different ponds during April '99-March, 2000

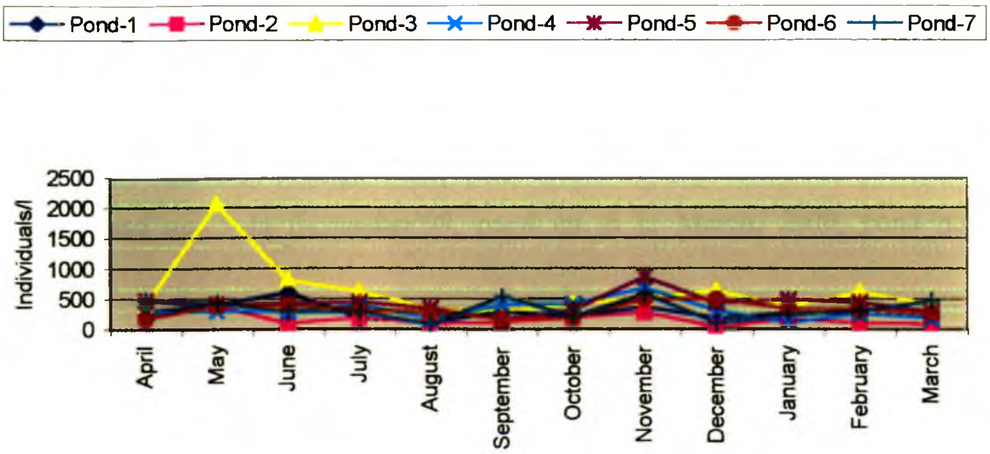


Fig-69 : Monthly abundance of *Trichocera* in different ponds during April '98-March '99

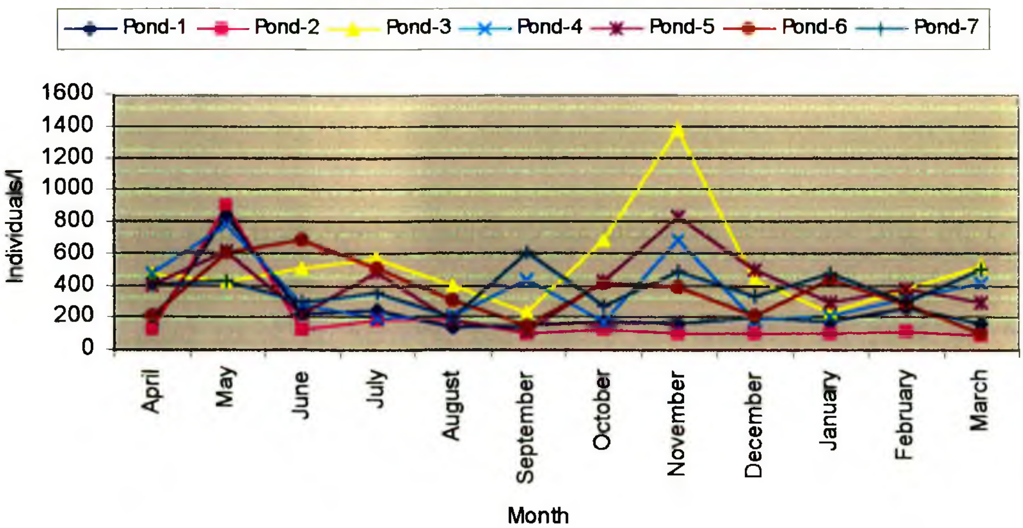


Fig-70 : Monthly abundance of *Trichocera* in different ponds during April '99-March, 2000

And the minimum abundance (Figs. 69, 70, Table-98) was in case of pond no. 1 in December'98, pond no. 2 in December'98, pond no. 3 in September'98, pond no. 4 in January'99, pond no. 5 in September'98, pond no. 6 in September'98, pond no. 7 in August'98. Similarly, during the work from April'99-March, 2000 the maximum abundance (Table-99) was in case of pond no. 1 in May'99, pond no. 2 in May'99, pond no. 3 in October'99, pond no. 4 in May'99, pond no. 5 in November'99, pond no. 6 in June'99, pond no. 7 in September'99. And the minimum abundance (Table-99) was in case of pond no. 1 in August'99, pond no. 2 in March, 2000, pond no. 3 in September'99, pond no. 4 in October'99, pond no. 5 in September'99, pond no. 6 in March, 2000, pond no. 7 in August'99.

***Notholca* (Plate-48)**

During the work from April'98-March'99 the maximum abundance (Figs. 71, 72, Table-100) was in case of pond no. 1 in September'98, pond no. 2 in November'98, pond no. 3 in November'98, pond no. 4 in November'98, pond no. 5 in November'98, pond no. 6 in November'98, pond no. 7 in March'98. And the minimum abundance (Figs. 71, 72, Table-100) was in case of pond no. 1 in August'98, pond no. 2 in August'98, pond no. 3 in August'98, pond no. 4 in August'98, pond no. 5 in September'98, pond no. 6 in March'99, pond no. 7 in August'98. Similarly, in the study period from April'99-March, 2000 the maximum abundance (Table-101) was in case of pond no. 1 in November'99, pond no. 2 in November'99, pond no. 3 in October'99, pond no. 4 in March'99, pond no. 5 in November'99, pond no. 6 in November'99, pond no. 7 in April'99. And the minimum abundance (Table-101) was in case of pond no. 1 in August'99, pond no. 2 in March'99, pond no. 3 in December'99, pond no. 4 in August'99, pond no. 5 in September'99, pond no. 6 in September'99, pond no. 7 in August'99.

Polyarthra

During the work from April'98-March'99 the maximum abundance (Fig. 74, Table-102) was in case of pond no. 1 in March'98, pond no. 2 in March'98, pond no. 3 in November'98, pond no. 4 in April'98, pond no. 5 in November'98, pond no. 6 in November'98, pond no. 7 in November'98. And the minimum abundance (Fig. 74, Table-102) was in case of pond no. 1 in June'98, pond no. 2 in March'99, pond no. 3 in June'98, pond no. 4 in June'98, pond no. 5 in March'99, pond no. 6 in October'99, pond no. 7 in August'98.

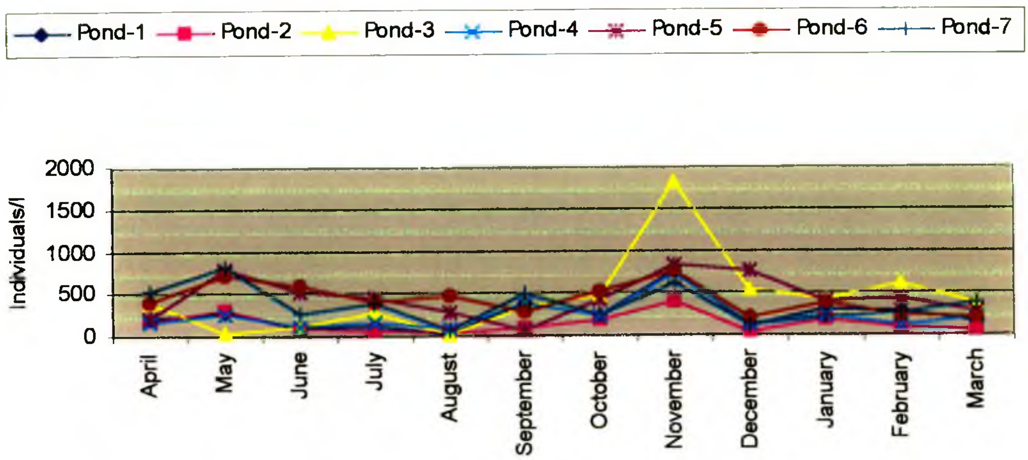


Fig-71 : Monthly abundance of *Notholca* in different ponds during April '98-March 99

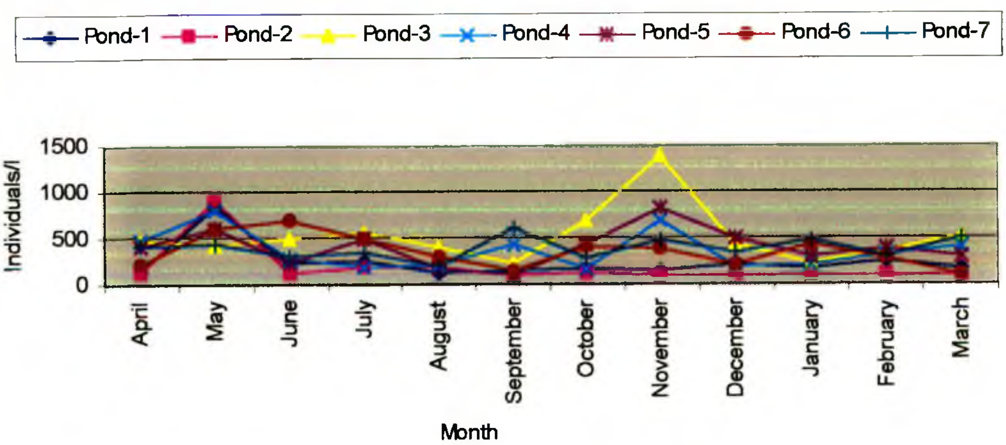


Fig. 72: Monthly abundance of *Notholca* in different ponds during April`99-March. 2000

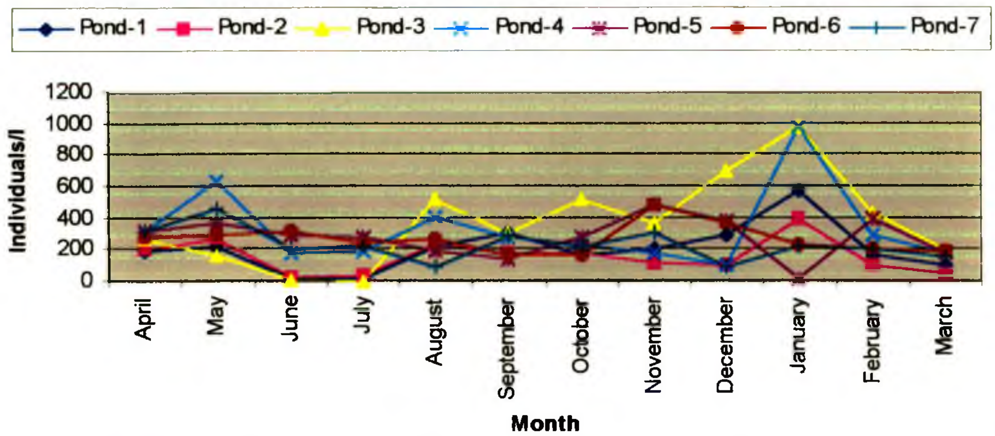


Fig-73: Monthly abundance of *Horaella* in different ponds during April `99-March, 2000

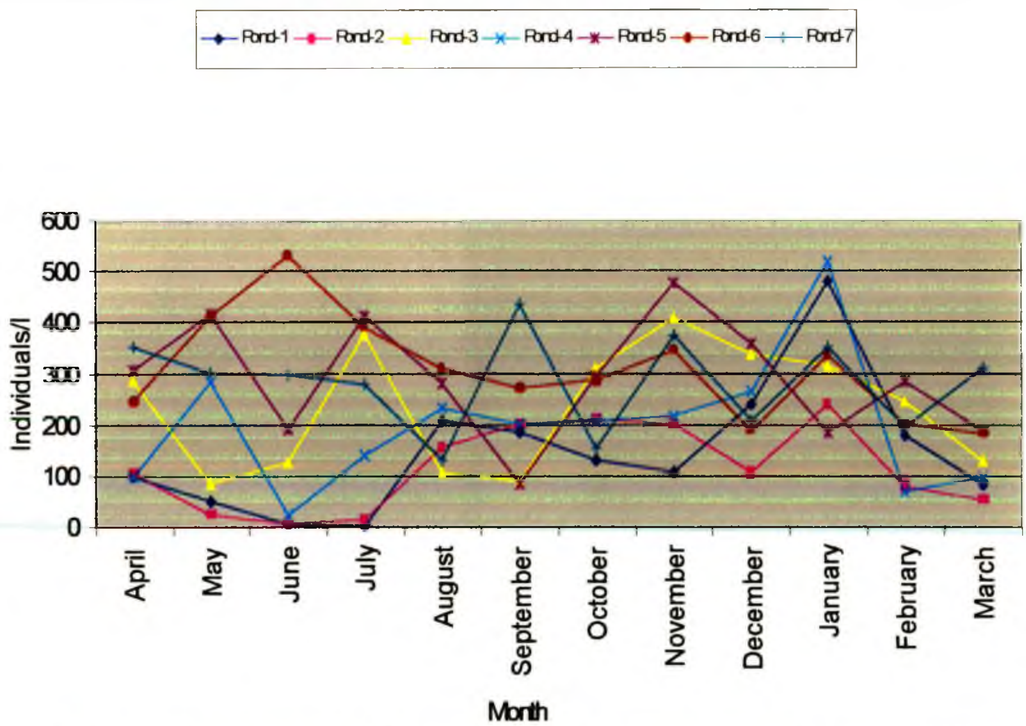


Fig-74 : Monthly abundance of *Polyarthra* in different ponds during April '99-March, 2000

Similarly, in the study period from April'99-March, 2000 the peak abundance (Table-103) was in case of pond no. 1 in November'99, pond no. 2 in November'99, pond no. 3 in November'99, pond no. 4 in November'99, pond no. 5 in December'99, pond no. 6 in March'99, pond no. 7 in April'99. And the minimum abundance (Table-103) was in case of pond no. 1 in June'99, pond no. 2 in June'99, pond no. 3 in August'99, pond no. 4 in June'99, pond no. 5 in September'99, pond no. 6 in March, 2000, pond no. 7 in October'99.

***Horaella* (Plate-49)**

During the work from April'98-March'99 the maximum abundance (Fig. 73, Table-104) was in case of pond no. 1 in September'98, pond no. 2 in January'99, pond no. 3 in December'98, pond no. 4 in May'98, pond no. 5 in November'98, pond no. 6 in December'98, pond no. 7 in May'98. And the minimum abundance (Fig. 73,Table-104) was in case of pond no. 1 in June'98, pond no. 2 in June'98, pond no. 3 in July'98, pond no. 4 in December'98, pond no. 5 in March'99, pond no. 6 in October'98, pond no. 7 in August'98. Similarly, in the study period from April'99-March, 2000 the maximum abundance (Table-105) was in case of pond no. 1 in January, 2000, pond no. 2 in October'99, pond no. 3 in November'99, pond no. 4 in January, 2000, pond no. 5 in November'99, pond no. 6 in June'99, pond no. 7 in September'99. And the minimum abundance (Table-105) was in case of pond no. 1 in July'99, pond no. 2 in June'99, pond no. 3 in September'99, pond no. 4 in February, 2000, pond no. 5 in September'99, pond no. 6 in March, 2000, pond no. 7 in August'99.

Lepadella

During the work from April'98-March'99 the maximum abundance (Figs. 75, 76, Table-106) was in case of pond no. 1 in December'98, pond no. 2 in December'98, pond no. 3 in December'98, pond no. 4 in November'98, pond no. 5 in November'98, pond no. 6 in November'98, pond no. 7 in May'98. And the minimum abundance (Figs. 75, 76, Table-106) was in case of pond no. 1 in August'98, pond no. 2 in August'98, pond no. 3 in September'98, pond no. 4 in March'99, pond no. 5 in September'98, pond no. 6 in September'98, pond no. 7 in August'98. Similarly, in the study period from April'99-March, 2000 the maximum abundance (Table-107) was in case of pond no. 1 in December'99, pond no. 2 in December'99, pond no. 3 in November'99, pond no. 4 in December'99, pond no. 5 in July'99, pond no. 6 in June'99, pond no. 7 in April'99.

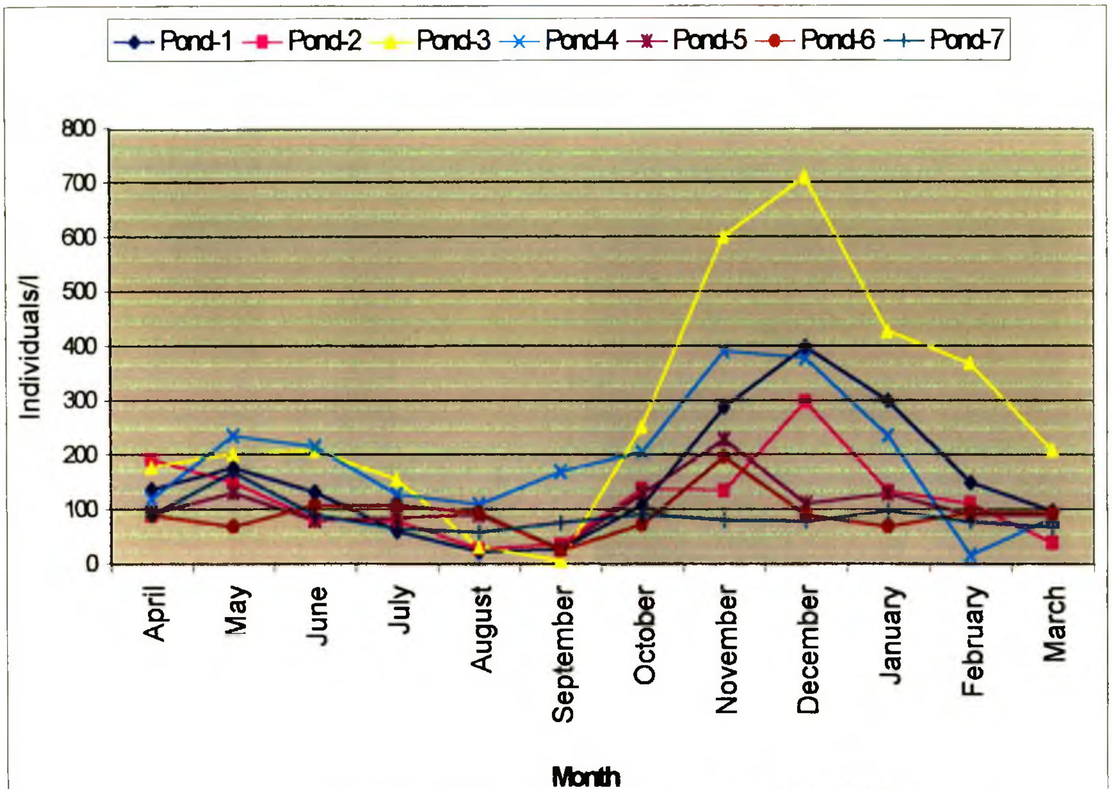


Fig-75 : Monthly abundance of *Lepadella* in different pond during April '98-March '99

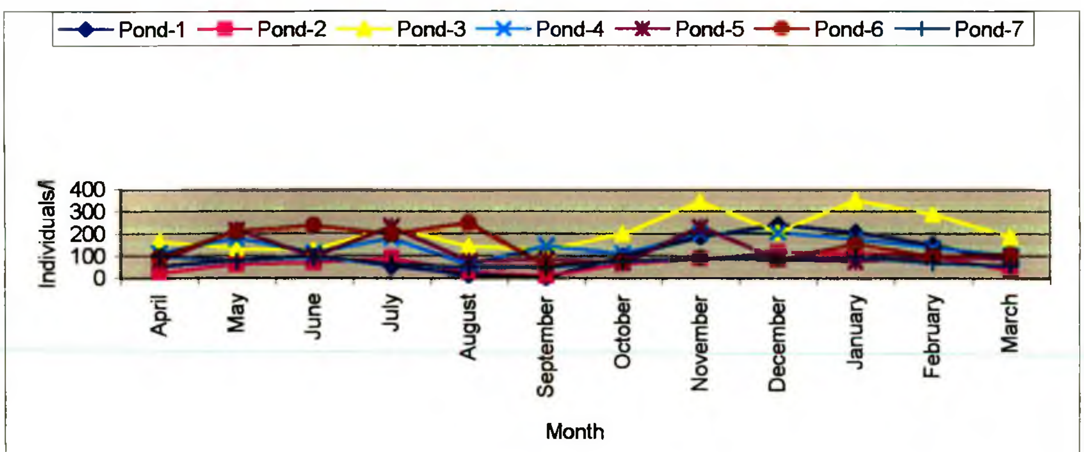


Fig-76 : Monthly abundance of *Lepadella* in different pond during April '99-March, 2000

And the minimum abundance (Table-107) was in case of pond no. 1 in September'99, pond no. 2 in September'99, pond no. 3 in June'99, pond no. 4 in August'99, pond no. 5 in October'99, pond no. 6 in September'99, pond no. 7 in August'99.

***Notomata* (Plate-50)**

During the work from April'98-March'99, the maximum abundance (Table-108) was in case of pond no. 1 in March'99, pond no. 2 in May'98, pond no. 3 in October'98, pond no. 4 in October'98, pond no. 5 in November'98, pond no. 6 in November'98, pond no. 7 in May'98. And the minimum abundance (Table-108) was in case of pond no. 1 in June'98, pond no. 2 in July'98, pond no. 3 in September'98, pond no. 4 in August'98, pond no. 5 in November'98, pond no. 6 in November'98, pond no. 7 in May'98. Similarly, in the study period from April'99-March, 2000 the maximum abundance (Table-109) was in case of pond no. 1 in March, 2000, pond no. 2 in December'99, pond no. 3 in November'99, pond no. 4 in May'99, pond no. 5 in November'99, pond no. 6 in June'99, pond no. 7 in April'99. The minimum abundance (Table-109) was in case of pond no. 1 in July'99, pond no. 2 in September'99, pond no. 3 in August'99, pond no. 4 in August'99, pond no. 5 in September'99, pond no. 6 in March, 2000, pond no. 7 in February, 2000.

***Cyrtonia* (Plate-51)**

During the work from April'98-March'99, the maximum abundance (Figs. 77, 78, Table-110) was in case of pond no. 1 in May'98, pond no. 2 in May'98, pond no. 3 in December'98, pond no. 4 in May'98, pond no. 5 in December'98, pond no. 6 in November'98, pond no. 7 in May'98. And the minimum abundance (Figs. 77, 78, Table-110) was in case of pond no. 1 in June'98, pond no. 2 in June'98, pond no. 3 in May'98, pond no. 4 in March'99, pond no. 5 in September'98, pond no. 6 in September'98, pond no. 7 in August'98. Similarly, in the study period from April'99-March, 2000 the maximum abundance (Table-111) was in case of pond no. 1 in May'99, pond no. 2 in May'99, pond no. 3 in June'99, pond no. 4 in November'99, pond no. 5 in November'99, pond no. 6 in June'99, pond no. 7 in September'99. The minimum abundance (Table-111) was in case of pond no. 1 in February, 2000, pond no. 2 in June'99, pond no. 3 in August'99, pond no. 4 in June'99, pond no. 5 in September'99, pond no. 6 in March, 2000, pond no. 7 in August'99.

Plate-49 : Horaella

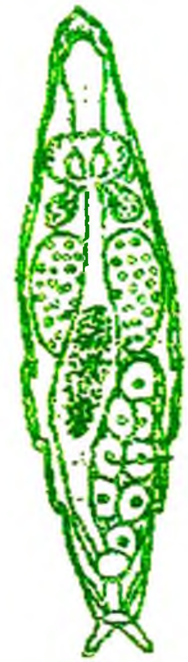


Plate-50 : Notommata

Plate-51 : Cyrtonia

Plate-52 : Asplancha

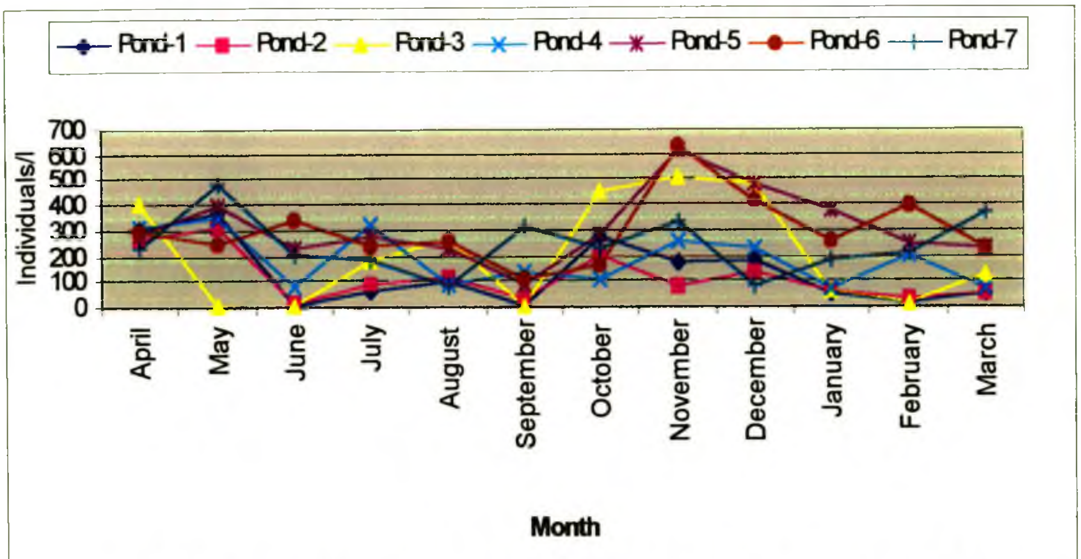


Fig-77 : Monthly abundance of *Cyrtonia* in different pond during April '98-March '99

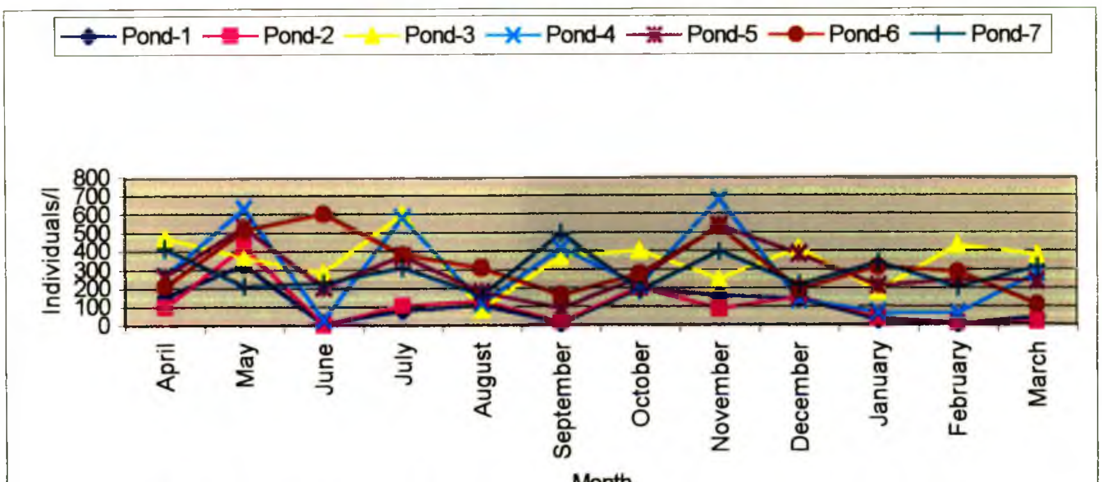


Fig-78 : Monthly abundance of *Cyrtonia* in different pond during April '99-March, 2000

Asplancha (Plate-52)

During the work from April'98-March'99 the maximum abundance (Figs. 79, 80, Table-112) was in case of pond no. 1 in December'98, pond no. 2 in April'98, pond no. 3 in June'98, pond no. 4 in June'98, pond no. 5 in January'99, pond no. 6 in December'98, pond no. 7 in November'98. And the minimum abundance (Figs. 79, 80, Table-112) was in case of pond no. 1 in April'98, pond no. 2 in March'99, pond no. 3 in April'98, pond no. 4 in October'98, pond no. 5 in August'98, pond no. 6 in April'98, pond no. 7 in July'98. Similarly, in the study period from April'99-March, 2000 the maximum abundance (Table-113) was in case of pond no. 1 in May'99, pond no. 2 in August'99, pond no. 3 in February'99, pond no. 4 in February, 2000, pond no. 5 in July'99, pond no. 6 in June'99, pond no. 7 in January, 2000. And the minimum abundance (Table-113) was in case of pond no. 1 in November'99, pond no. 2 in November'99, pond no. 3 in June'99, pond no. 4 in October'99, pond no. 5 in December'99, pond no. 6 in March, 2000, pond no. 7 in February, 2000.

Brachionus (Plate-44)

During the work from April'98-March'99 the maximum abundance (Figs. 81, 82, Table-114) was in case of pond no. 1 in December'98, pond no. 2 in May'98, pond no. 3 in December'98, pond no. 4 in May'98, pond no. 5 in May'98, pond no. 6 in June'98, pond no. 7 in July'98. And the minimum abundance (Figs. 81, 82, Table-114) was in case of pond no. 1 in May'98, pond no. 2 in June'98, pond no. 3 in July'98, pond no. 4 in August'98, pond no. 5 in September'98, pond no. 6 in July'98, pond no. 7 in August'98. Similarly, in the study period from April'99-March, 2000 the maximum abundance (Table-115) was in case of pond no. 1 in January, 2000, pond no. 2 in May'99, pond no. 3 in December'99, pond no. 4 in July'99, pond no. 5 in November'99, pond no. 6 in May'99, pond no. 7 in June'99. And the minimum abundance (Table-115) was in case of pond no. 1 in July'99, pond no. 2 in July'99, pond no. 3 in June'99, pond no. 4 in August'99, pond no. 5 in August'99, pond no. 6 in July'99, pond no. 7 in August'99.

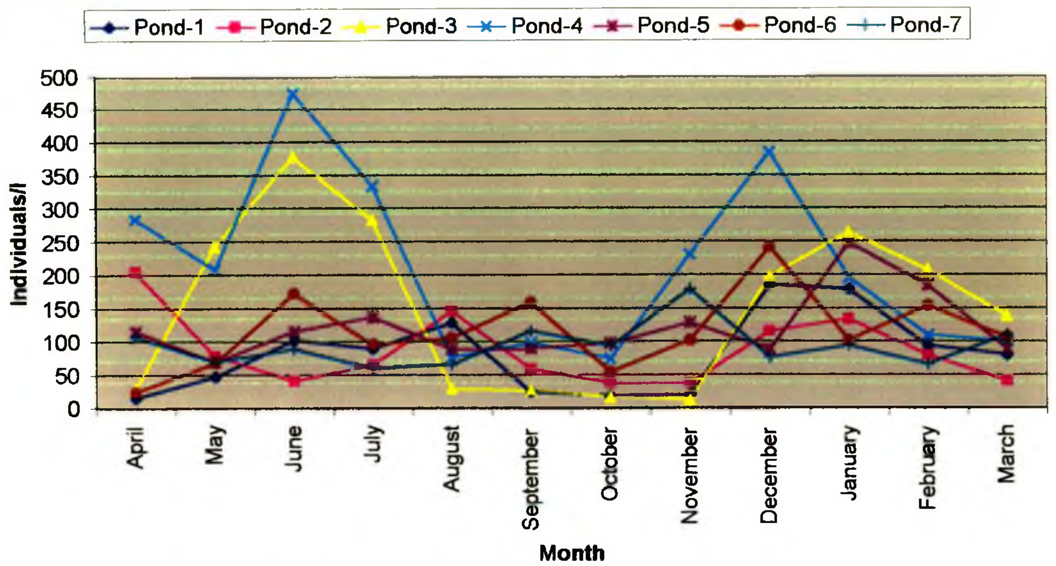


Fig-79 : Monthly abundance of *Asplancha* in different pond during April '98-March '99

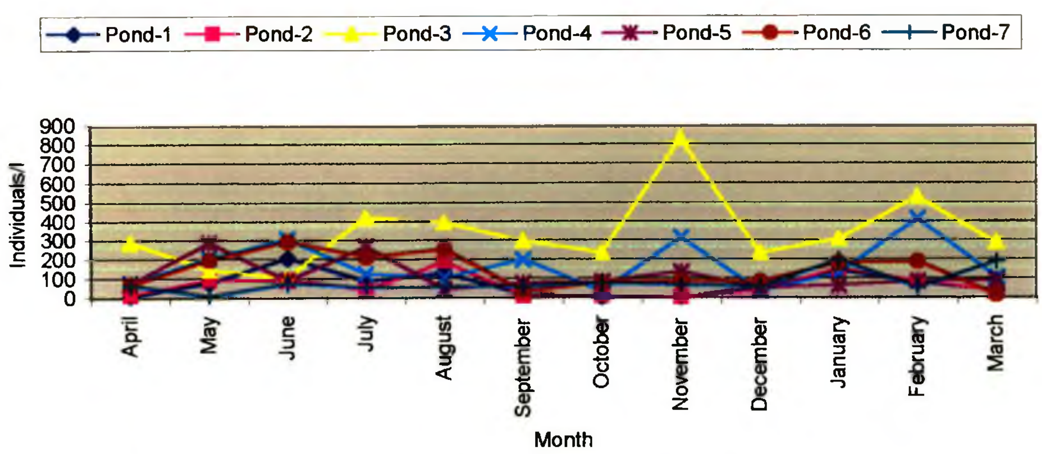


Fig-80 : Monthly abundance of *Asplancha* in different pond during April '99-March, 2000

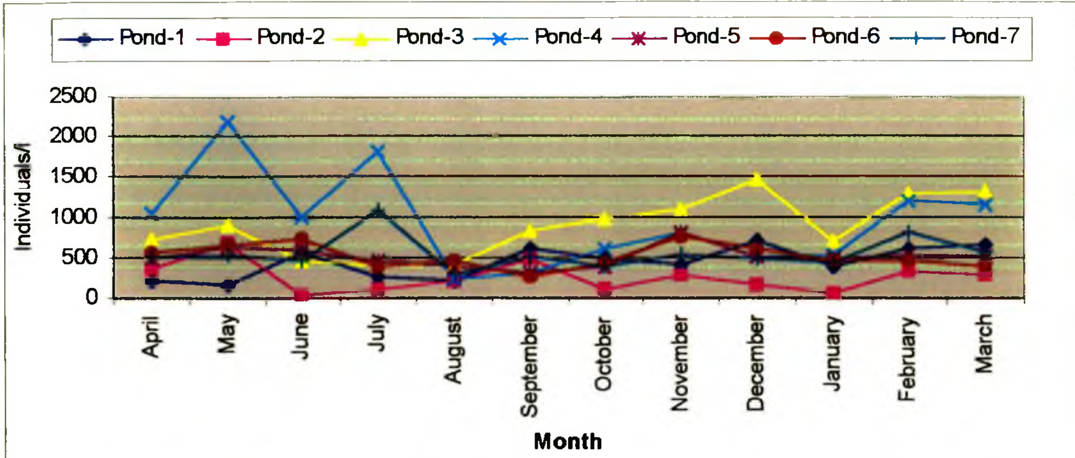


Fig-81 : Monthly abundance of *Brachionus* in different pond during April '98-March '99

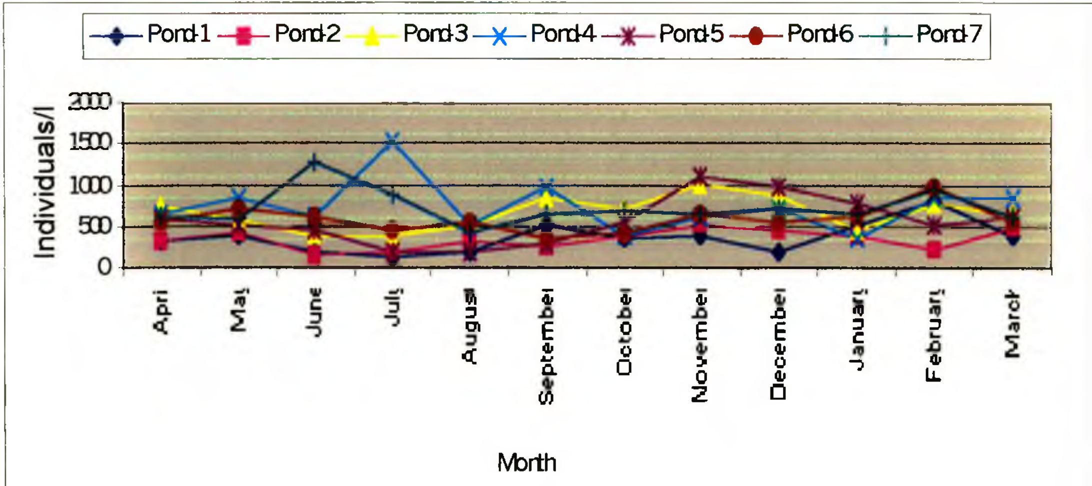


Fig-82 : Monthly abundance of *Brachionus* in different pond during April '99-March 2000

Cladocera

Cladocera was one of the major group of zooplankton. In case of pond no. 1 in the year April'98-March'99 the population abundance was maximum in December'98 i.e. 26.81% and was minimum in September'98 i.e. 8.78% (Fig. 83, Table-116, 117). Similarly, in April'99-March, 2000 it was maximum in January, 2000 i.e. 21.60% and minimum in September'99 i.e. 9.76% (Table-118, 119). In case of pond no. 2 in the year April'98-March'99 the population abundance was maximum in January'99 i.e. 28.33% and was minimum in September'98 i.e. 10.05% (Fig. 83, Table-116, 117). Similarly, in April'99-March, 2000 it was maximum in October'99 i.e. 27.44% and minimum in September'99 i.e. 11.02% (Table-118, 119). In case of pond no. 3 in the year April'98-March'99 the population abundance was maximum in August'98 i.e. 27.61% and was minimum in May'98 i.e. 9.68% (Fig. 83, Table-116, 117). Similarly, in April'99-March, 2000 it was maximum in December'99 i.e. 32.62% and minimum in May'99 i.e. 11.57% (Table-118, 119). In case of pond no. 4 in the year April'98-March'99 the population abundance was maximum in December'98 i.e. 34.96% and was minimum in July'98 i.e. 8.25% (Fig. 83, Table-116, 117). Similarly, in April'99-March, 2000 it was maximum in December'99 i.e. 32.51% and minimum in July'99 i.e. 3.98% (Table-118, 119). In case of pond no. 5 in the year April'98-March'99 the population abundance was maximum in August'98 i.e. 26.71% and was minimum in May'98 i.e. 9.84% (Fig. 83, Table-116, 117). Similarly, in April'99-March, 2000 it was maximum in August'99 i.e. 25.68% and minimum in May'99 i.e. 11.06% (Table-118, 119). In case of pond no. 6 in the year April'98-March'99 the population abundance was maximum in July'98 i.e. 27.27% and was minimum in May'98 i.e. 13.17% (Fig. 83, Table-116, 117). Similarly, in April'99-March, 2000 it was maximum in December'99 i.e. 41.91% and minimum in August'99 i.e. 14.43% (Table-118, 119). In case of pond no. 7 in the year April'98-March'99 the population abundance was maximum in December'98 i.e. 37.34% and was minimum in July'98 i.e. 5.38% (Fig. 83, Table-116, 117). Similarly, in April'99-March, 2000 it was maximum in December'99 i.e. 24.15% and minimum in April'99 i.e. 9.51% (Table-118, 119). By applying four feed samples in different ponds in the year April'98-March'99 (Table-116, 117) the comparative highest Cladoceran abundance was in pond-7 in December'98 i.e. 37.34% where feed sample-4 was applied. In the period April'99-March, 2000 (Table-118, 119) the comparative minimum abundance was in pond-4 in July'99 i.e. 3.98% where feed sample-2 was applied.

***Daphnia* (Plate-28, 53)**

During the work from April'98-March'99 the maximum abundance (Fig. 84, Table-120) was in case of pond no. 1 in January'99, pond no. 2 in November'98, pond no. 3 in December'98, pond no. 4 in December'98, pond no. 5 in January'98, pond no. 6 in February'99, pond no. 7 in February'99. And the minimum abundance (Fig. 85, Table-120) was in case of pond no. 1 in April'98, pond no. 2 in April'98, pond no. 3 in April'98, pond no. 4 in April'98, pond no. 5 in September'98, pond no. 6 in August'98, pond no. 7 in July'98. Similarly, in the study period from April'99-March, 2000 the maximum abundance (Table-121) was in case of pond no. 1 in October'99, pond no. 2 in February, 2000, pond no. 3 in July'99, pond no. 4 in June'99, pond no. 5 in December'99, pond no. 6 in June'99, pond no. 7 in December'99. And the minimum abundance (Table-121) was in case of pond no. 1 in April'99, pond no. 2 in April'99, pond no. 3 in May'99, pond no. 4 in July'99, pond no. 5 in April'99, pond no. 6 in August'99, pond no. 7 in April'99.

***Bosmina* (Plate-54)**

During the work from April'98-March'99 the maximum abundance (Figs. 85, 86, Table-122) was in case of pond no. 1 in December'98, pond no. 2 in December'98, pond no. 3 in December'98, pond no. 4 in December'98, pond no. 5 in July'98, pond no. 6 in June'98, pond no. 7 in December'98. And the minimum abundance (Fig. 85, 86, Table-122) was in case of pond no. 1 in February'99, pond no. 2 in February'99, pond no. 3 in October'98, pond no. 4 in March'99, pond no. 5 in October'98, pond no. 6 in September'98, pond no. 7 in July'98. Similarly, in the study period from April'99-March, 2000 the maximum abundance (Table-123) was in case of pond no. 1 in May'99, pond no. 2 in May'99, pond no. 3 in July'99, pond no. 4 in December'99, pond no. 5 in July'99, pond no. 6 in June'99, pond no. 7 in February, 2000. And the minimum abundance (Table-123) was in case of pond no. 1, March, 2000, pond no. 2 in March, 2000, pond no. 3 in May'99, pond no. 4 in May'99, pond no. 5 in September'99, pond no. 6 in July'99, pond no. 7 in August'99.

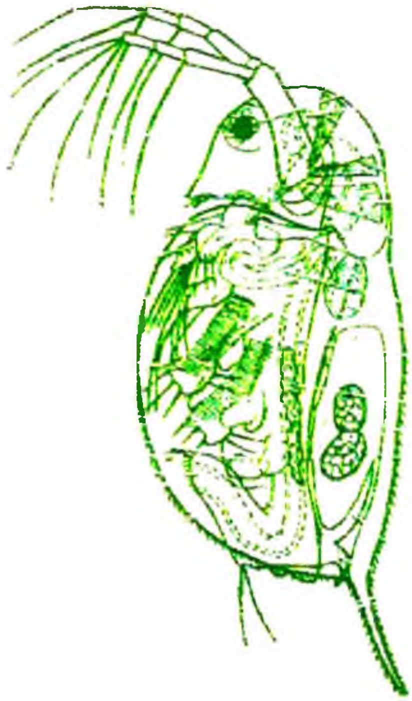


Plate-53 : Daphnia

Plate-54 : Bosmina

Plate-55 : Moina

Plate-56 : Sida

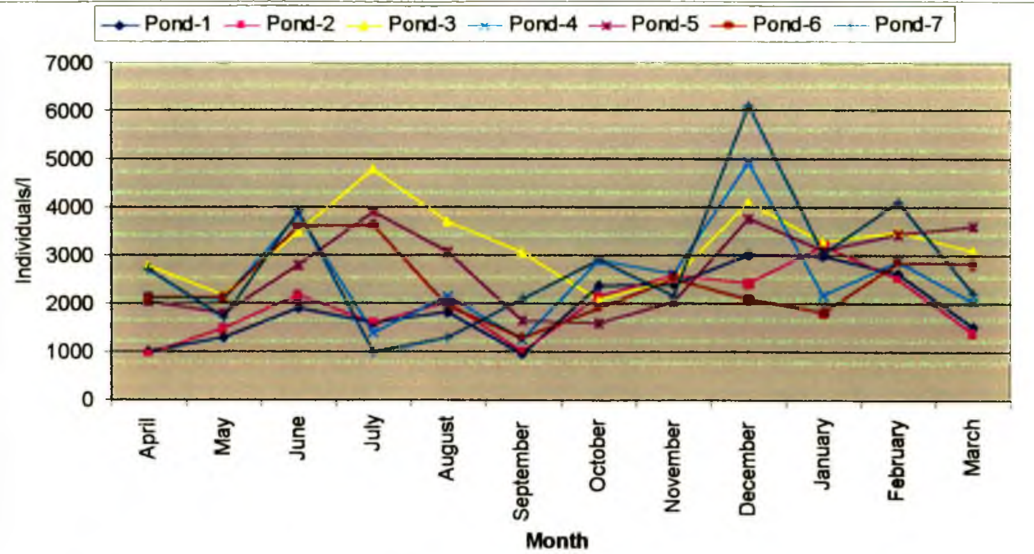


Fig-83 : Monthly abundance of Cladocera in different pond during April '98-March '99

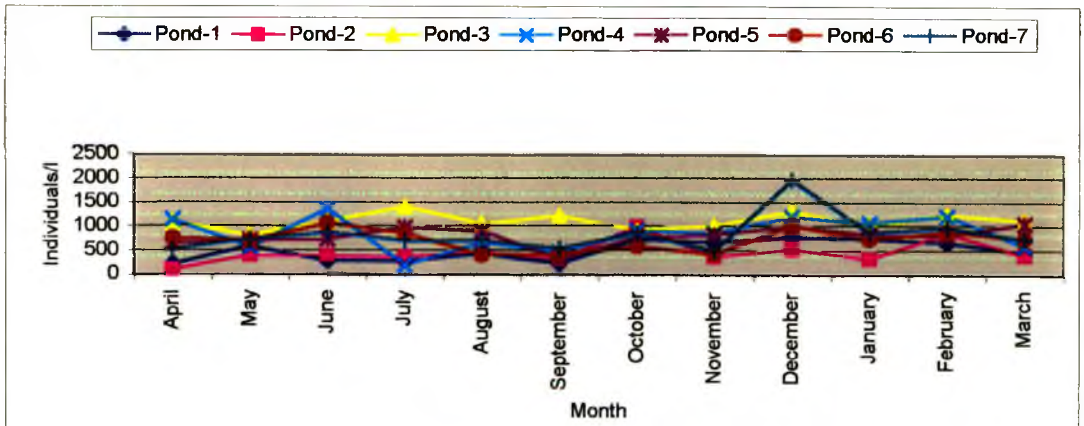


Fig-84 : Monthly abundance of *Daphnia* in different pond during April '98-March 99

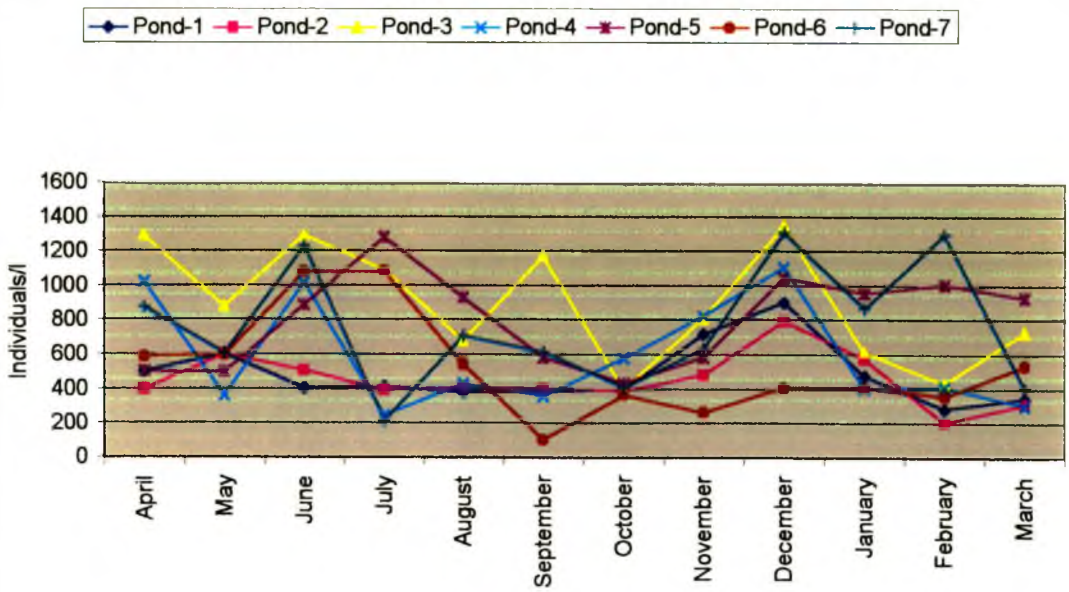


Fig-85 : Monthly abundance of *Bosmina* in different pond during April '98-March'99

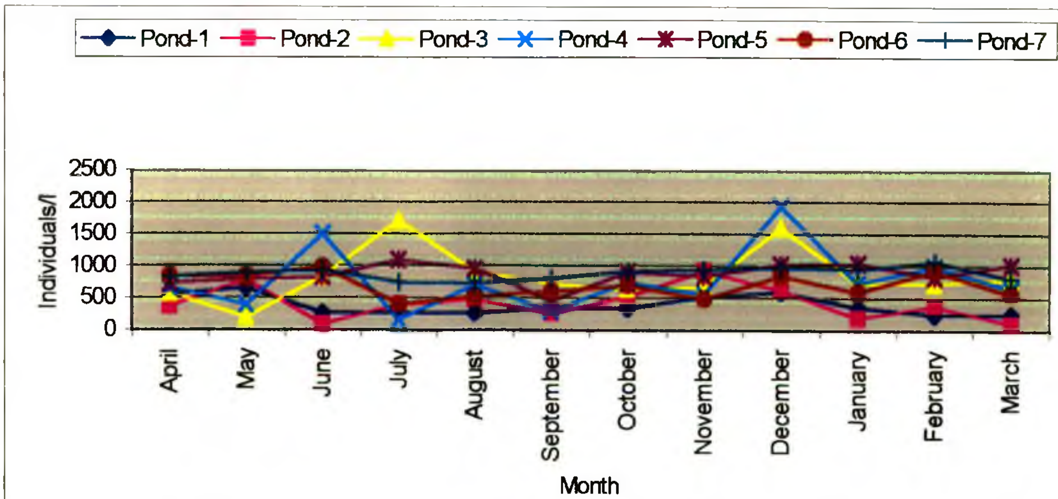


Fig-86 : Monthly abundance of *Bosmina* in different pond during April '99-March, 2000

Moina (Plate-55)

During the work from April'98-March'99 the maximum abundance (Figs. 87, 88, Table-124) was in case of pond no. 1 in January'99, pond no. 2 in January'99, pond no. 3 in February'99, pond no. 4 in February'99, pond no. 5 in February'99, pond no. 6 in June'98, pond no. 7 in December'98. And the minimum abundance (Figs. 87, 88, Table-124) was in case of pond no. 1 in September'98, pond no. 2 in September'98, pond no. 3 in November'98, pond no. 4 in September'98, pond no. 5 in October'98, pond no. 6 in September'98, pond no. 7 in July'98. Similarly, in the study period from April'99-March, 2000 the minimum abundance (Table-125) was in case of pond no. 1 in September'99, pond no. 2 in April'99, pond no. 3 in May'99, pond no. 4 in July'99, pond no. 5 in April'99, pond no. 6 in September'99, pond no. 7 in April'99. And the maximum abundance (Table-125) was in case of pond-1 in February, 2000, pond no. 2 in October'99, pond no. 3 in July'99, pond no. 4 in February, 2000, pond no. 5 in July'99, pond no. 6 in October'99, pond no. 7 in February, 2000.

Sida (Plate-56)

During the work from April'98-March'99 the maximum abundance (Figs. 89, 90, Table-126) was in case of pond no. 1 in August'98, pond no. 2 in August'98, pond no. 3 in August'98, pond no. 4 in June'98, pond no. 5 in August'98, pond no. 6 in December'98, pond no. 7 in December'98. And the minimum abundance (Figs. 89, 90, Table-126) was in case of pond no. 1 in May'98, pond no. 2 in May'98, pond no. 3 in May'98, pond no. 4 in October'98, pond no. 5 in April'98, pond no. 6 in August'98, pond no. 7 in July'98.

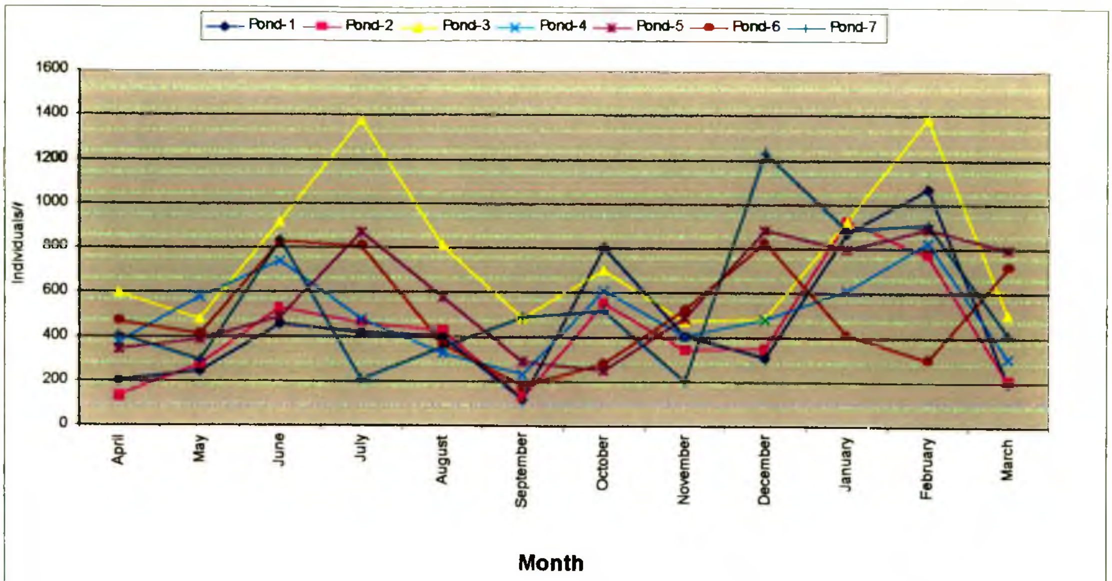


Fig-87. : Monthly abundance of *Moina* in different pond during April '98-March'99

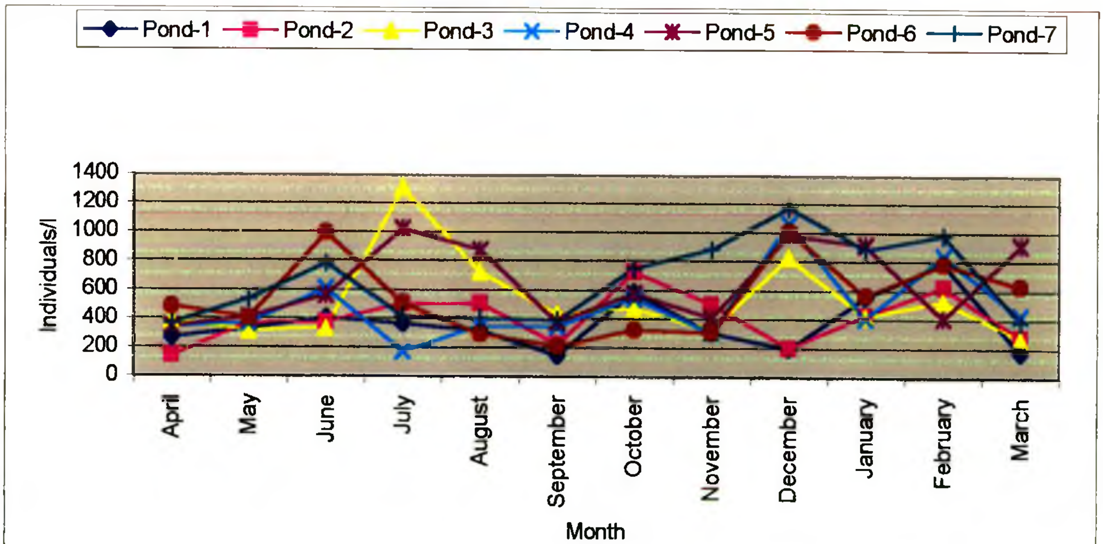


Fig-88 : Monthly abundance of *Moina* in different pond during April '99-March, 2000

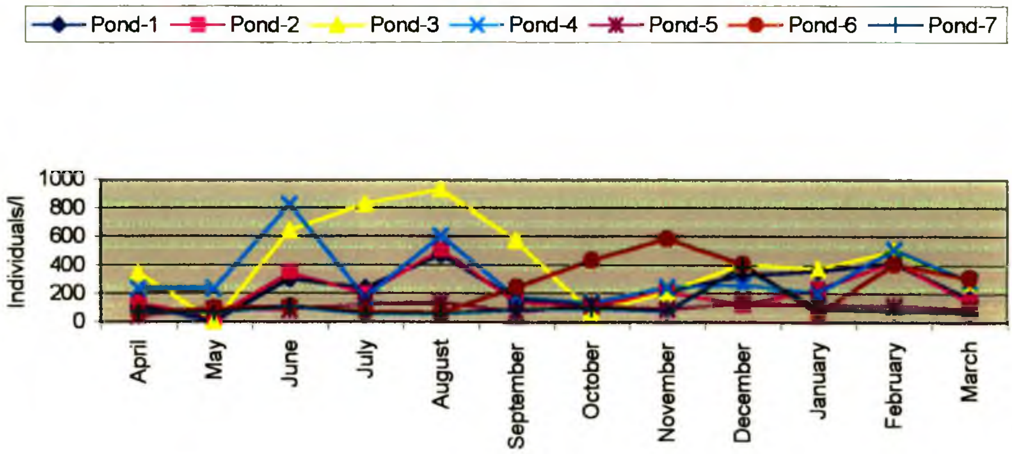


Fig-89 : Monthly abundance of *Sida* in different pond during April '98-March '99

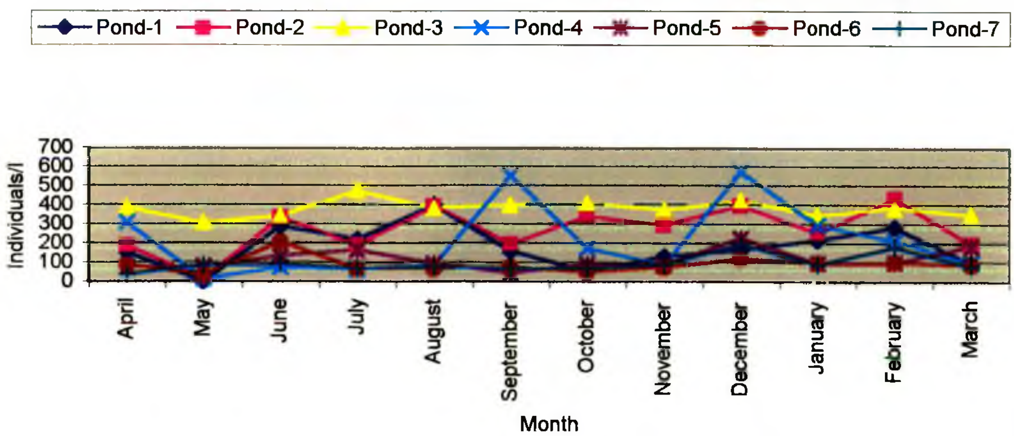


Fig-90 : Monthly abundance of *Sida* in different pond during April '99-March, 2000

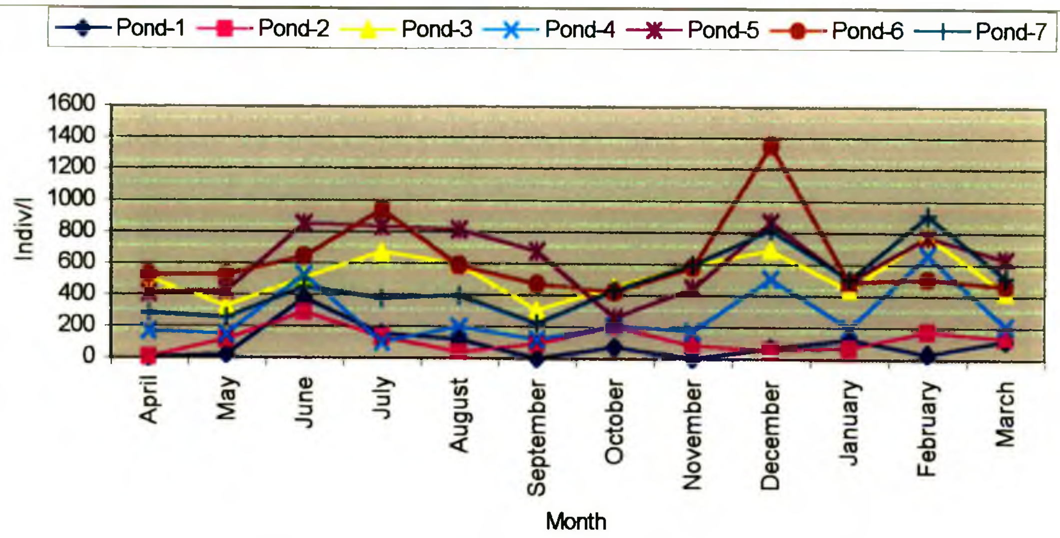


Fig-91 : Monthly abundance of *Alona* in different pond during April '99-March, 2000

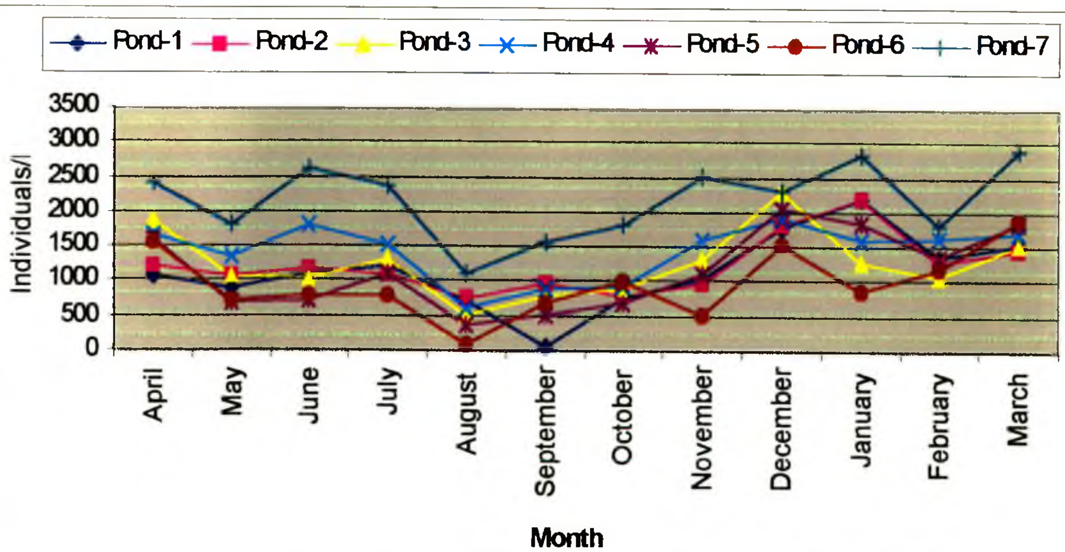


Fig-92 : Monthly abundance of Ostracoda in different pond during April '98-March '99

Similarly, in the study period from April'99-March, 2000 the maximum peak abundance (Table-127) was in case of pond no. 1 in August'99, pond no. 2 in January, 2000, pond no. 3 in July'99, pond no. 4 in September'99, pond no. 5 in December'99, pond no. 6 in June'99, pond no. 7 in December'99. And the minimum abundance (Table-127) was in case of pond no. 1 in May'99, pond no. 2 in May'99, pond no. 3 in May'99, pond no. 4 in May'99, pond no. 5 in September'99, pond no. 6 in May'99, pond no. 7 in April'99.

Alona

During the work from April'98-March'99 the maximum abundance (Fig. 91, Table-128) was in case of pond no. 1 in June'98, pond no. 2 in June'98, pond no. 3 in June'98, pond no. 4 in June'98, pond no. 5 in March'99, pond no. 6 in February'99, pond no. 7 in December'98. And the minimum abundance (Fig. 91, Table-128) was in case of pond no. 1 in April'98, pond no. 2 in April'98, pond no. 3 in June'98, pond no. 4 in March'99, pond no. 5 in November'98, pond no. 6 in March'99, pond no. 7 in May'98. Similarly, in the study period from April'99-March, 2000 the peak abundance (Table-129) was in case of pond no. 1 in June'99, pond no. 2 in June'99, pond no. 3 in December'99, pond no. 4 in February, 2000, pond no. 5 in June'99, pond no. 6 in December'99, pond no. 7 in February, 2000. And the minimum abundance (Table-129) was in case of pond no. 1 in September'99, pond no. 2 in April'99, pond no. 3 in September'99, pond no. 4 in July'99, pond no. 5 in October'99, pond no. 6 in October'99, pond no. 7 in April'99.

Ostracoda

Ostracoda was one of the important group of zooplankton. Through out the research period by applying four samples of feed in seven ponds, in the year April'98-March'99 the comparative maximum abundance was found to be in pond no. 7 in March'99, i.e. 15.60%, where feed sample no. 4 was applied (Figs. 92, 93, Table-130, 131). And the minimum abundance was in pond-4 in August'98, i.e. 4.76%, where feed sample-2 was applied (Figs. 92, 93, Table-130, 131). Similarly, in the research period from April'99-March, 2000 the maximum abundance was in pond no. 7 in July'99, i.e. 16.58% (Table-132, 133), where feed sample 4 was applied and minimum abundance was in pond no. 1 in October'99, i.e. 7.78% (Table-132, 133). Ostracoda were represented by the following genus.

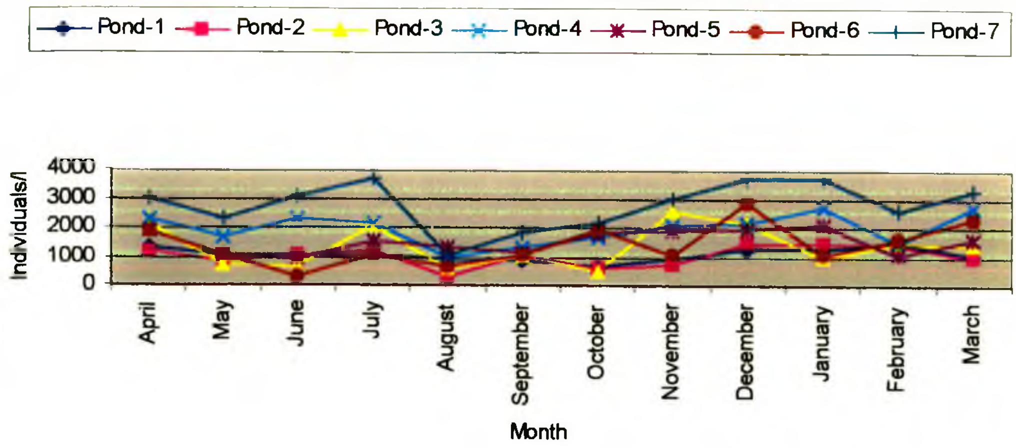


Fig-93 : Monthly abundance of Ostracoda in different pond during April '99-March, 2000

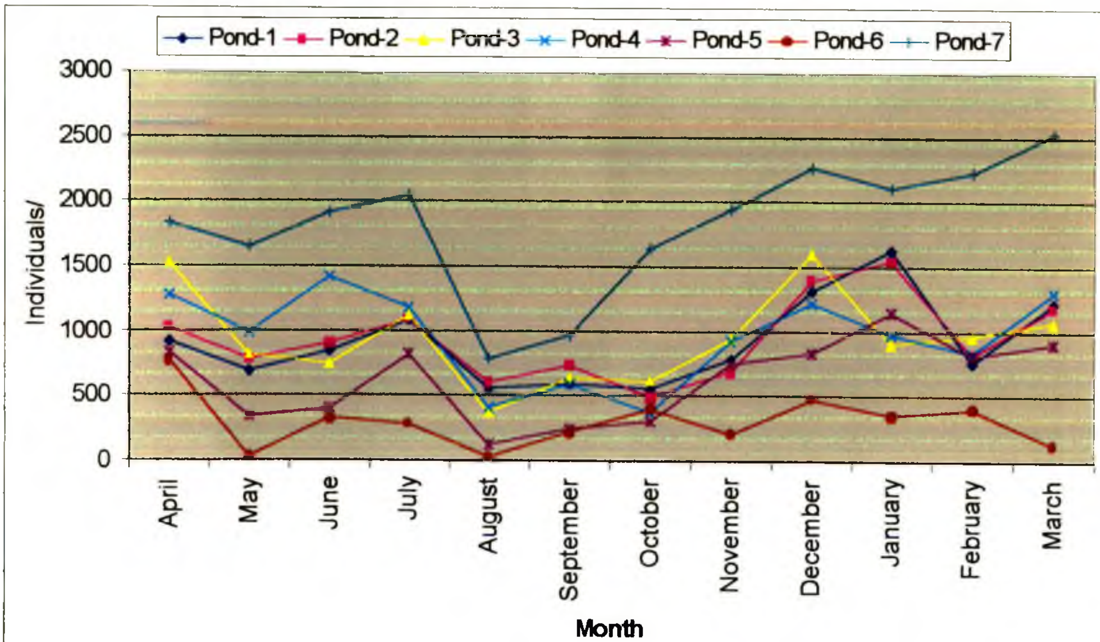


Fig-94 : Monthly abundance of *Cypris* in different pond during April '98-March 99

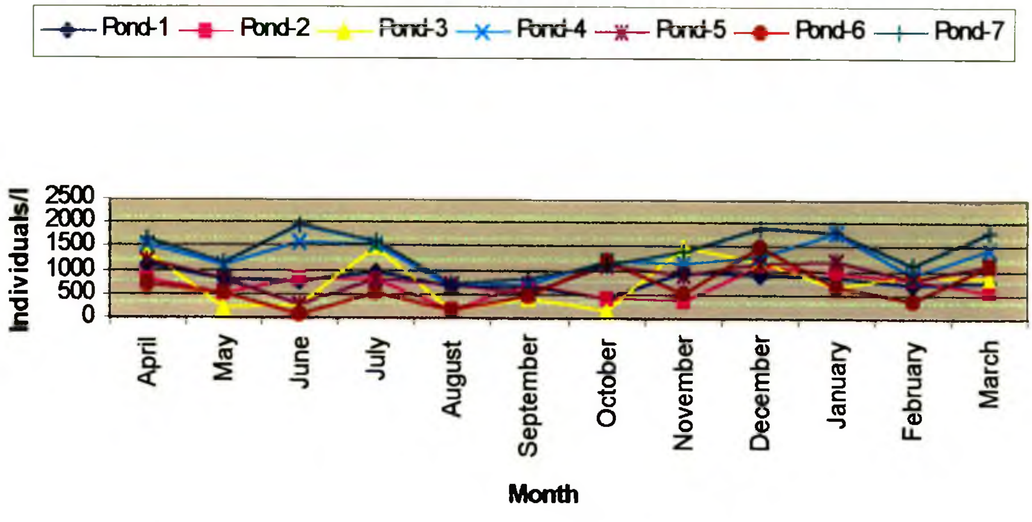


Fig-95 : Monthly abundance of *Cypris* in different pond during April '99-March, 2000

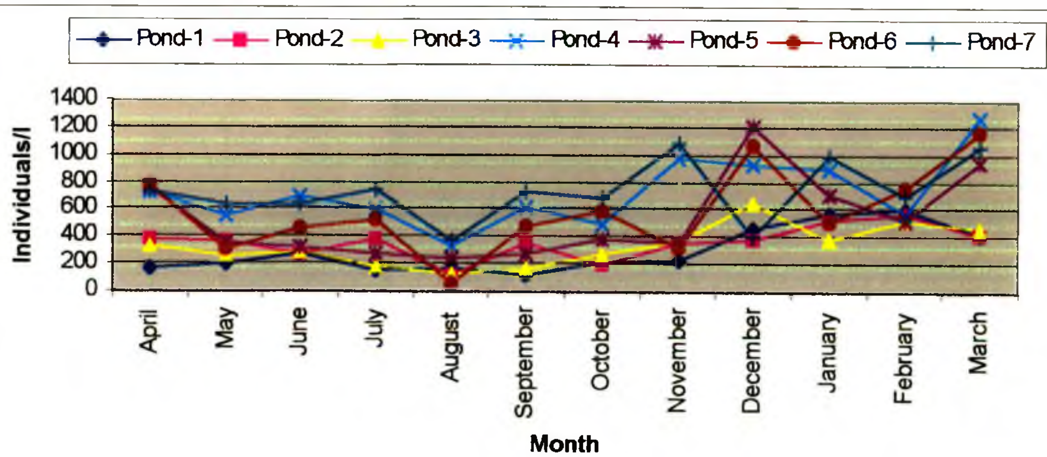


Fig-96 : Monthly abundance of *Heterocypris* in different pond during April '98-March '99

Cypris **(Plate-29)**

During the work from April'98-March'99 the maximum abundance (Figs. 94, 95, Table-134) was in case of pond no. 1 in January'99, pond no. 2 in January'99, pond no. 3 in December'98. pond no. 4 in June'98, pond no. 5 in January'99, pond no. 6 in April'98, pond-7 in March'99. And the minimum abundance (Figs. 94, 95, Table-134) was in case of pond no. 1 in August'98, pond no. 2 in August'98, pond no. 3 in August'98, pond no. 4 in August'98, pond no. 5 in August'98, pond no. 6 in August'98, pond no. 7 in August'98. Similarly, in the study period from April'99-March, 2000 the maximum abundance (Table-135) was in case of pond no. 1 in April'99, pond no. 2 in December'99, pond no. 3 in July'99, pond no. 4 in August'99, pond no. 5 in January, 2000, pond no. 6 in December'99, pond no. 7 in June'99. And the minimum abundance (Table-135) was in case of pond no. 1 in October'99, pond no. 2 in August'99, pond no. 3 in August'99, pond no. 4 in August'99, pond no. 5 in September'99, pond no. 6 in June'99, pond no. 7 in August'99.

Heterocypris **(Plate-58)**

During the work from April'98-March'99 the peak abundance (Figs. 96, 97, Table-136) was in case of pond-1 in January'99, pond no. 2 in February'99, pond no. 3 in December'98, pond no. 4 in March'99, pond no. 5 in December'98, pond no. 6 in March'98, pond no. 7 in November'98. And the minimum abundance (Figs. 96, 97, Table-136) was in case of pond no. 1 in September'98, pond no. 2 in August'98, pond no. 3 in August'98, pond no. 4 in August'98, pond no. 5 in August'98, pond no. 6 in August'98, pond no. 7 in August'98. Similarly, in the study period from April'99-March, 2000 the peak abundance (Table-137) was in case of pond no. 1 in February, 2000, pond no. 2 in February, 2000, pond no. 3 in November'99, pond no. 4 in February, 2000, pond no. 5 in November'99, pond no. 6 in October'99, pond no. 7 in July'99. And the minimum abundance (Table-137) was in case of pond no. 1 in July'99, pond no. 2 in July'99, pond no. 3 in August'99, pond no. 4 in August'99, pond no. 5 in May'99, pond no. 6 in June'99, pond no. 7 in August'99.

Copepoda

Copepoda was one of the dominant group of zooplankton.

Plate-29 : Cypris

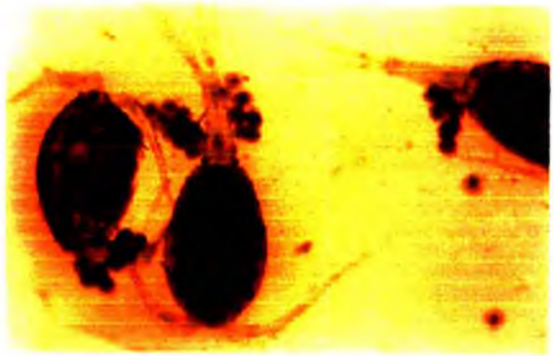


Plate-30 : Cyclops

Plate-31 : Indoplanorbis

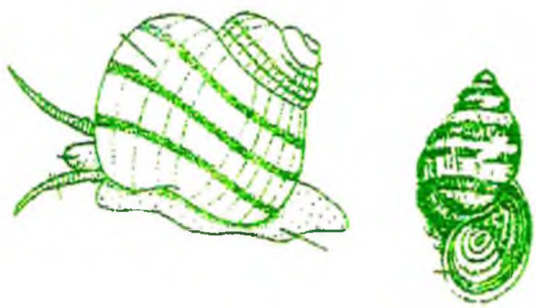


Plate-32 : Viviparus

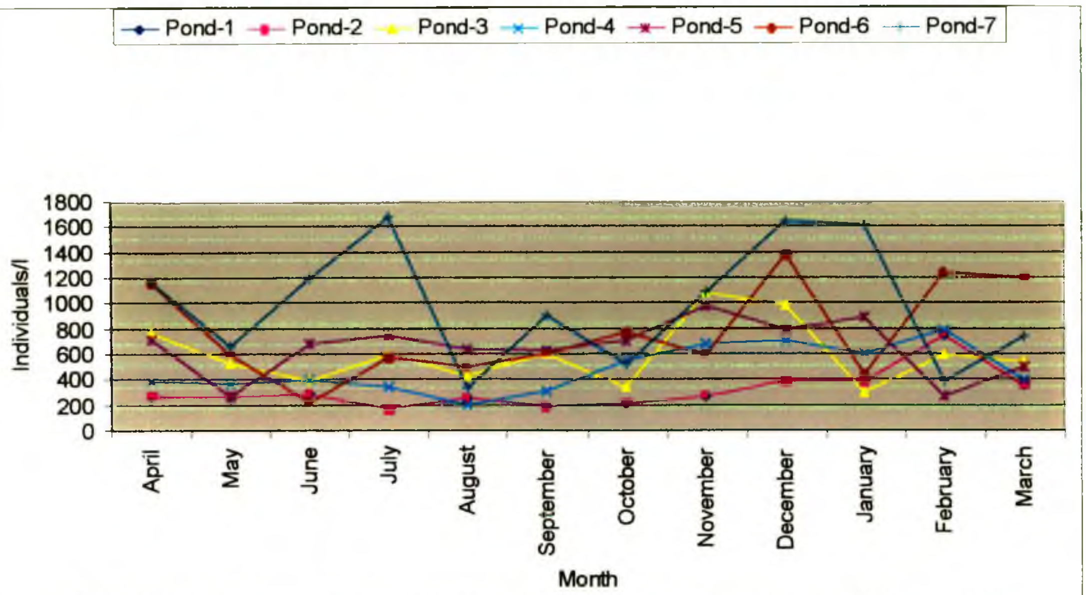


Fig-97 : Monthly abundance of *Heterocypris* in different pond during April '99-March, 2000

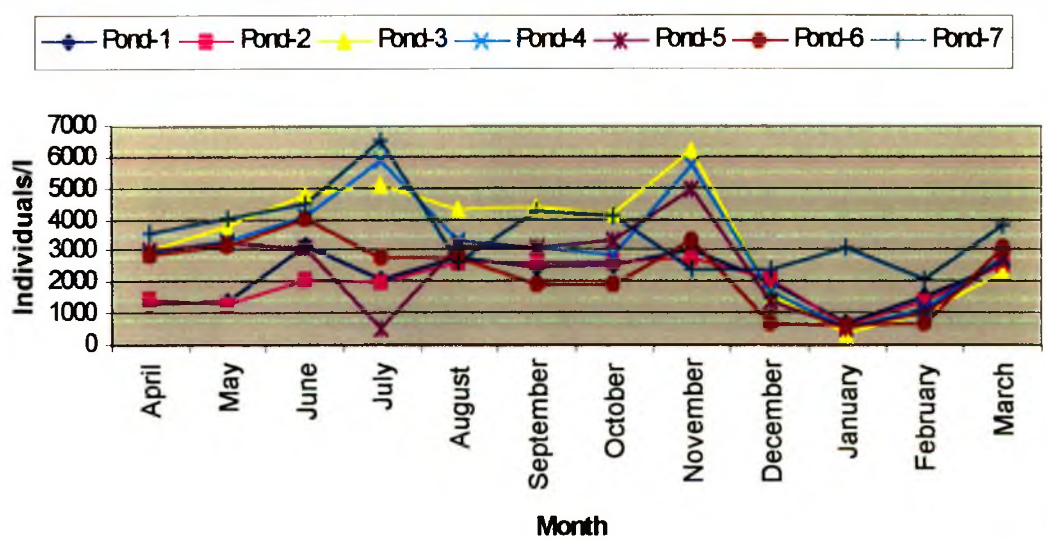


Fig-98 : Monthly abundance of Copepoda in different pond during April '98-March '99

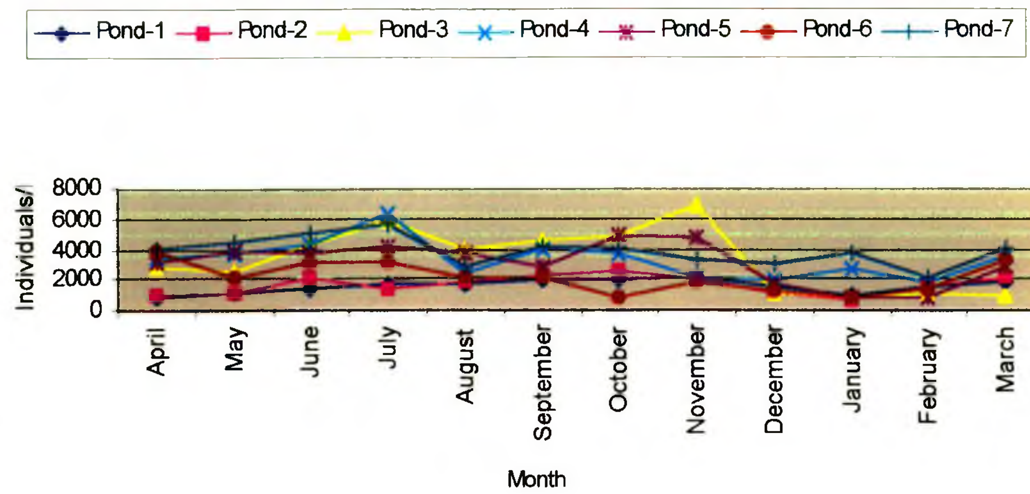


Fig-99 : Monthly abundance of Copepoda in different pond during April '99-March, 2000

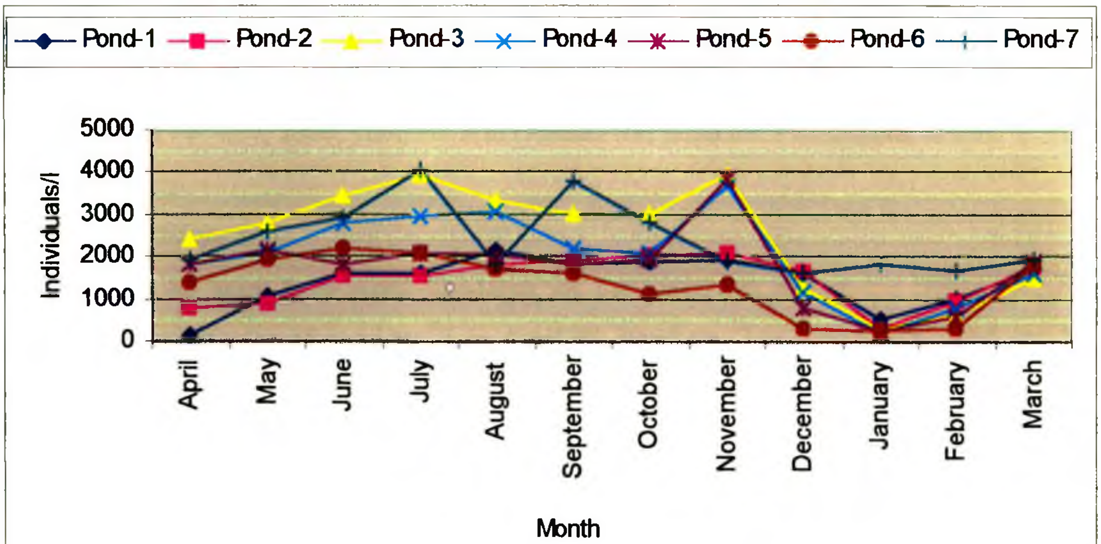


Fig-100 : Monthly abundance of *Cyclops* in different pond during April '98-March '99

Through out the research period by applying four samples of feed in seven ponds, in the year April'98-March'99 the population abundance (Figs. 98, 99, Table-138, 139) was maximum in November'98, i.e. 30.96% in pond no. 3 and minimum in January'99, i.e. 2.61% (Table-138, 139) in pond no. 3. Similarly, in the study period from April'99-March, 2000 the maximum population abundance (Table-140, 141) was in pond no. 3 inNovember'99 i.e. 28.70%, where feed sample no. 2 was applied and minimum abundance (Figs. 98, 99, Table-140, 141) was in pond no. 6 in January, 2000, i.e. 5.54%, where feed sample 3 was applied. The copepoda were represented by the following genus.

***Cyclops* (Plate-30)**

During the work from April'98-March'99 the peak abundance (Figs. 100, 101, Table-142) was in case of pond no. 1 in August'98, pond no. 2 in November'98, pond no. 3 in July'98, pond no. 4 in August'98, pond no. 5 in November'98, pond no. 6 in June'98, pond no. 7 in July'98. And the minimum abundance (Figs. 100, 101, Table-142) was in case of pond no. 1 in April'98, pond no. 2 in January'99, pond no. 3 in February'99, pond no. 4 in January'99, pond no. 5 in January'99, pond no. 6 in January'99, pond no. 7 in November'98. Similarly, in the study period from April'99-March, 2000 the maximum abundance (Table-143) was in case of pond no. 1 in September'99, pond no. 2 in October'99, pond no. 3 in July'99, pond no. 4 in July'99, pond no. 5 in October'99, pond no. 6 in April'99, pond no. 7 in June'99. And the minimum abundance (Table-143) was in case of pond no. 1 in February, 2000, pond no. 2 in May'99, pond no. 3 in February, 2000, pond no. 4 in February, 2000, pond no. 5 in February, 2000, pond no. 6 in October'99, pond no. 7 in December'99.

***Diaptomus* (Plate-57)**

During the work from April'98-March'99, the maximum abundance (Figs. 102, 103, Table-144) was in case of pond no. 1 in April'98, pond no. 2 in August'98, pond no. 3 in November'98, pond no. 4 in July'98, pond no. 5 in June'98, pond no. 6 in November'98, pond no. 7 in July'98. And the minimum abundance (Figs. 102, 103, Table-144) was in case of pond no. 1 in January'99, pond no. 2 in January'99, pond no. 3 in January'99, pond no. 4 in August'98, pond no. 5 in January'99, pond no. 6 in September'98, pond no. 7 in September'98.

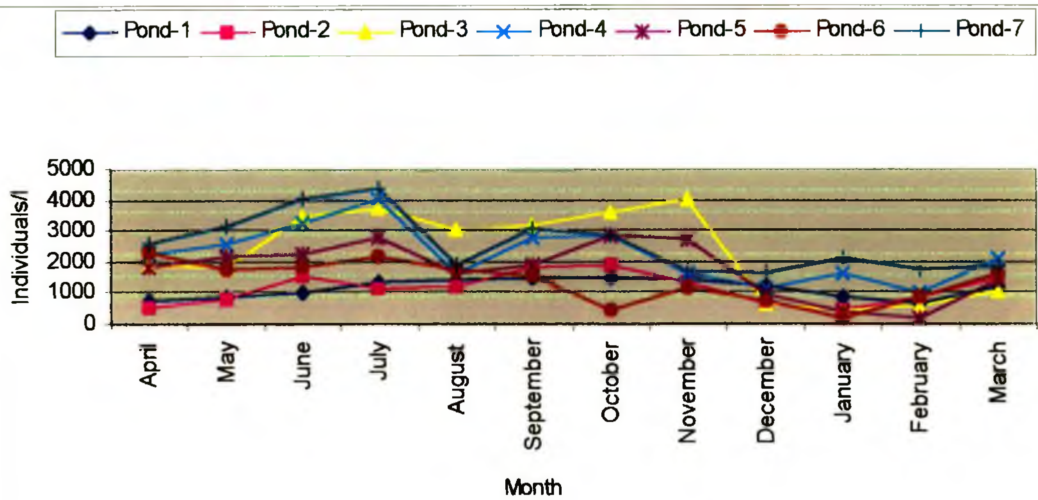


Fig-101 : Monthly abundance of *Cyclops* in different pond during April '99-March, 2000

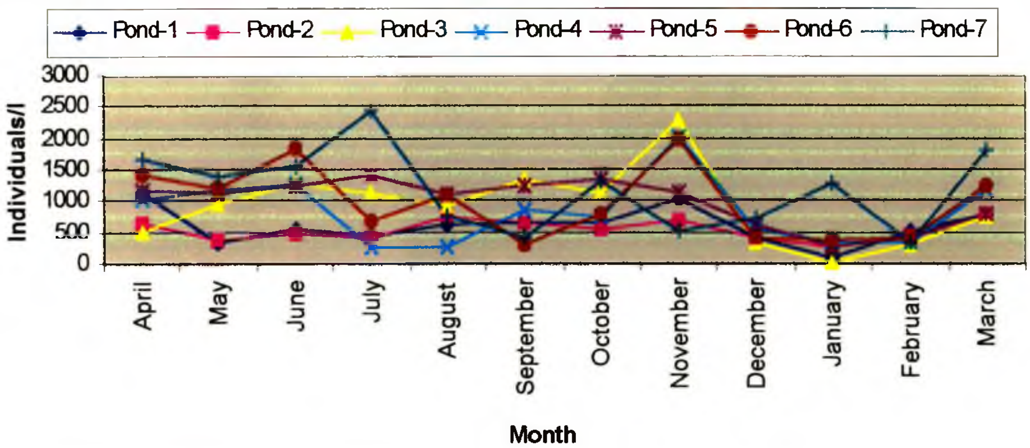


Fig-102 : Monthly abundance of *Diaptomus* in different pond during April '98-March '99

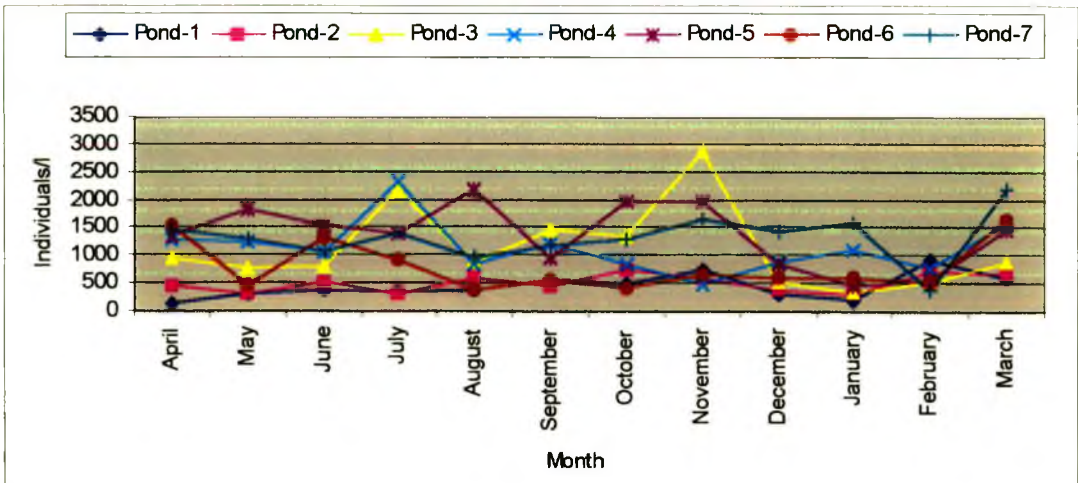


Fig-103 : Monthly abundance of *Diaptomus* in different pond during April '99-March, 2000

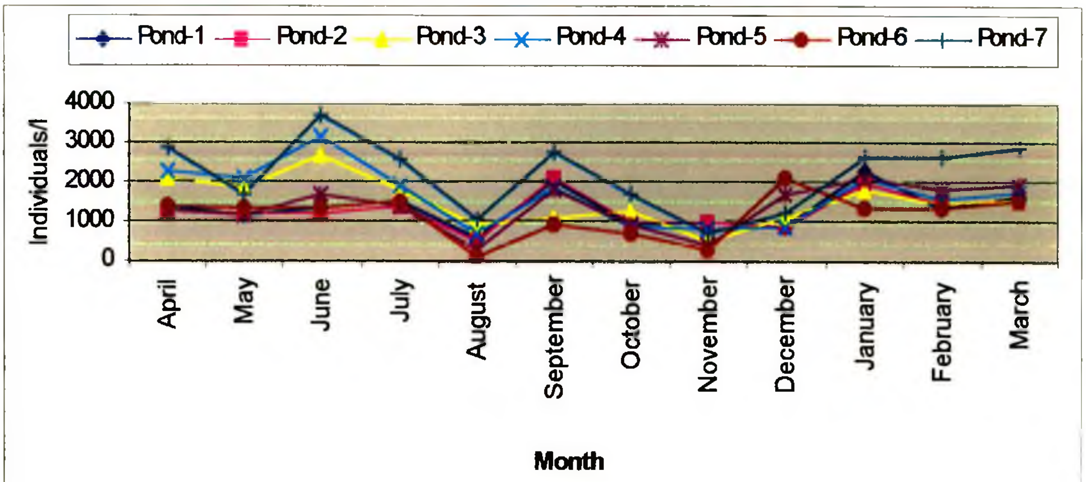


Fig-104 : Monthly abundance of *Nauplius* in different pond during April '98-March '99

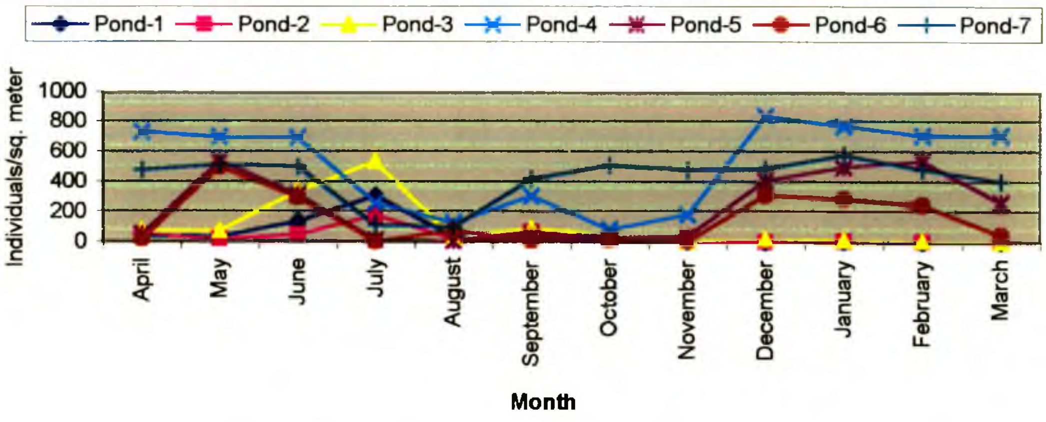


Fig-105 : Monthly fluctuations of *Tubifex* in different ponds in April '98-March '99

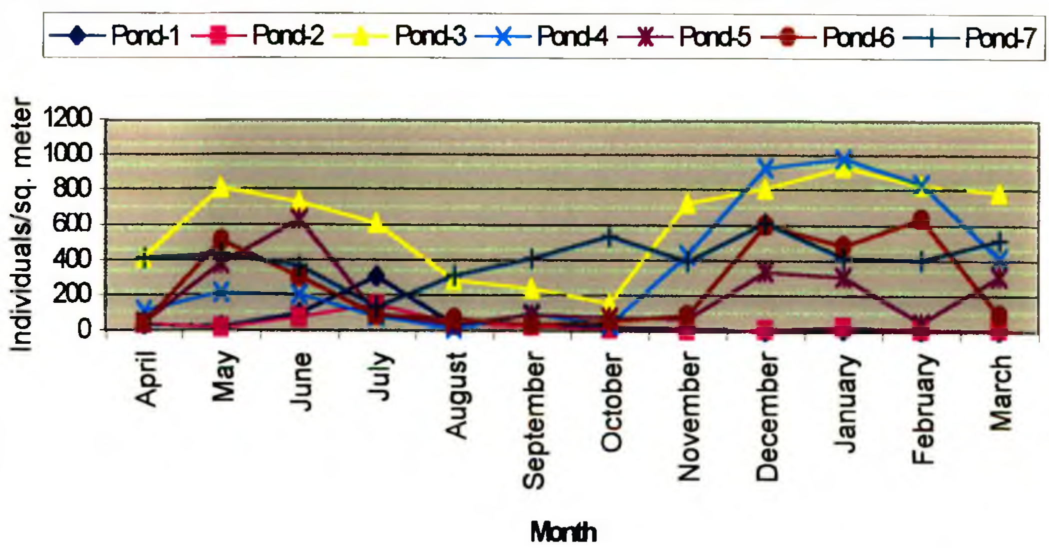


Fig-106 : Monthly fluctuations of *Tubifex* in different ponds in April '99-March ,2000.

Similarly, in the study period from April'99-March, 2000, the maximum abundance (Table-145) was in case of pond-1 in February, 2000, pond no. 2 in February, 2000, pond no. 3 in November'99, pond no. 4 in July'99, pond no. 5 in August'99, pond no. 6 in March, 2000, pond no. 7 in March, 2000. And the minimum abundance (Table-145) was in case of pond no. 1 in April'99, pond no. 2 in March'99, pond no. 3 in January, 2000, pond no. 4 in November'99, pond no. 5 in January, 2000, pond no. 6 in April'99, pond no. 7 in February, 2000.

Nauplius

In the studeid period from April'98-March'99 the maximum abundance (Fig. 104, Table-146, 147) of Nauplius larvae was in pond-7 in June'98 i.e. 18.67%. And the minimum abundance of Nauplius in that period (Fig. 104, Table-146, 147) was in pond no. 6 in April'98 i.e. 1.21%. Similarly, in the research period from April'99-March, 2000 the maximum abundance (Table-148, 149) of Nauplius was in pond no. 5 in August'99 i.e. 6.71%. And the minimum abundance of Nauplius in that period (Table-148, 149) was in pond no. 4 in November'99 i.e. 3.61%.

Protozoa

In the research period from April'98-March'99 the maximum abundance (Table nos. 150, 151) of Protozoan was in pond no. 3 in June'98 i.e. 32.29% where feed sample 2 was applied. The minimum abundance (Table-150, 151) was in pond no. 1 in October'98 i.e. 7.48% where feed sample 1 was applied. Similarly, in the research period from April'99-March, 2000 the maximum abundance (Table-152, 153) of Protozoa was in pond no. 5 in June'99 i.e. 39.46% where feed sample 3 was applied and minimum abundance (Table-152, 153) was in pond no. 3 in December'99 i.e. 4.80% where feed sample 2 was applied.

Others

Other than the above groups of zooplankton some other miscellaneous non-abundant zooplankters were also occasionally observed these were *Hydra, Arachnida,* Dipteran larvae, few insects (e.g *Belostoma, Notonecta*), insect nymph etc.

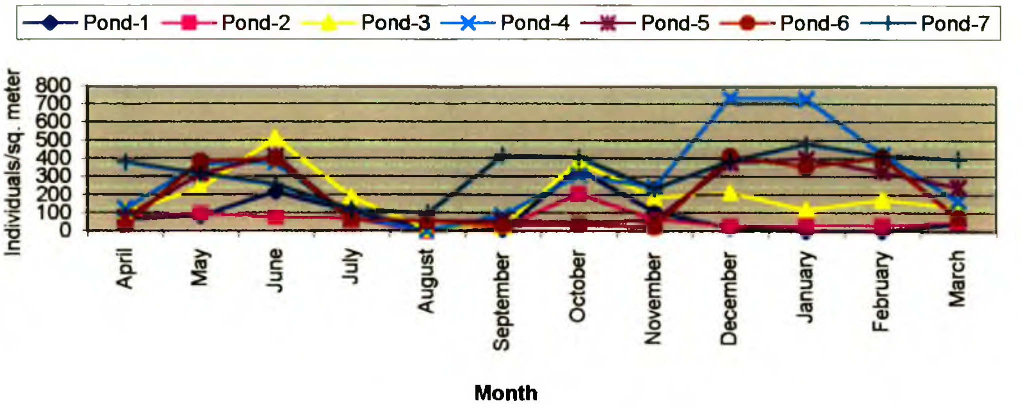


Fig-107 : Monthly fluctuations of *Dero* in different ponds in April '98-March '99

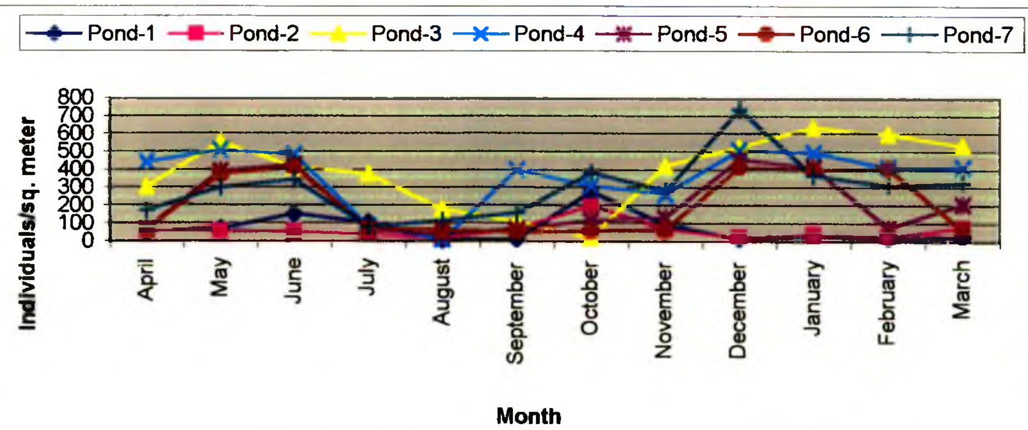


Fig-108 : Monthly fluctuations of *Dero* in Different ponds in April '99-March, 2000.

Although in the studied period April'98-March'99 their maximum (Table-154, 155) contribution was in pond no. 6 in June'98 i.e. 0.81 % and minimum abundance (Table-154, 155) was in pond no. 3 in January'99, i.e. 0 %. Similarly, in the research period from April'99-March, 2000 their maximum (Table-156, 157) contribution was in pond no. 5 in October'99 i.e. 0.83 % and minimum (Table-156, 157) contribution in pond no. 3 in January, 2000 i.e. 0.07 %.

3.5. BENTHOS

In the study qualitative and quantitative observations was made on monthly basis. The major benthic groups observed in various ponds were Oligochaeta, Chironomid and Mollusca. On the basis of their abundance they were ranked as follows: Oligochaeta > Chironomid > Mollusca. The abundance of different group was as follows:

Oligochaeta:

During the study period from April'98-March'99 the maximum abundance of Oligochaeta in pond no. 4 (Table-158) was in December'98 i.e. 69.67% (Table-159) and minimum abundance in pond no. 4, at August'98, (Table-158) i.e. 23.60% (Table-159). Similarly, during the study period from April'99-March, 2000 the maximum abundance of Oligochaeta was in pond no. 3 (Table-160) in January, 2000 i.e. 60.28% (Table-161) and minimum abundance in pond no. 2 in July'99 (Table-160) i.e. 20.50% (Table-161). The group of Oligochaeta was divided into 8 genera, these are described below.

Tubifex (Plate-28, 64)

During the study period from April'98-March'99 the maximum abundance of *Tubifex* was in case of pond no. 4 in January'99 (Figs. 105, 106, Table-162) and minimum abundance was in pond no. 1 in March'99 (Figs. 106, 107, Table-162). Similarly, during the study period from April'99-March, 2000 the maximum abundance was in pond no. 4 in January, 2000 (Figs. 105, 106, Table-163) and minimum abundance was in pond no. 1 in December'99 (Figs. 105, 106, Table-163).

Dero (Plate-62)

During the study period from April'98-March'99 the maximum abundance was in pond no. 4 in December'98 (Figs. 107, 108, Table-164) and minimum abundance was in pond no. 4 in August'98 (Figs. 108, 109, Table-164).

Plate-25 : Mrigal
(Cirrhinus mrigala)

Plate-26 : Carpio
(Cyprinus carpio)

Plate-27 : Tubifex

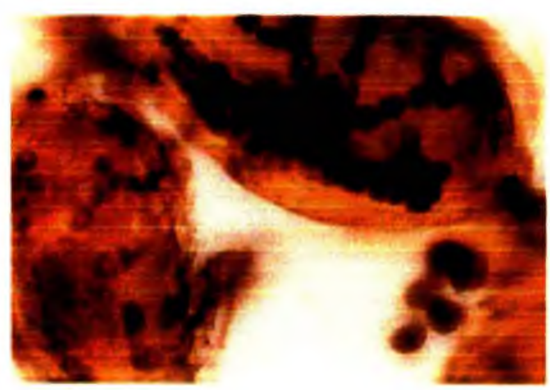


Plate-28 : Daphnia

Similarly, during the study period from April'99-March 2000 the maximum abundance was in pond no. 7 in December'99 (Figs. 107, 108, Table-165) and minimum abundance was in pond no. 1 in August'99 (Figs. 107, 108, Table-165).

***Nais* (Plate-65)**

During the study period from April'98-March'99 the maximum abundance was in pond no. 4 in December'98 (Figs. 109, 110, Table-166) and minimum abundance was in pond no. 1 in March'99 (Figs. 109, 110, Table-166). Similarly, during the study period from April'99-March, 2000 the maximum abundance was in pond no. 3 in January, 2000 (Figs. 109, 110, Table-167) and minimum abundance was in pond no. 1 in February, 2000 (Figs. 109, 110, Table-167).

***Mesenchytrachus* (Plate-66)**

During the study period from April'98-March'99, the maximum abundance was in pond-4 in January'99 (Figs. 111, 112, Table-168) and minimum abundance was in pond-1 in November'98 (Figs. 111, 112, Table-168). Similarly, during the study period from April'99-March, 2000 the maximum abundance was in pond no. 3 in June'99 (Figs. 111, 112, Table-169) and minimum abundance was in pond no. 1 in April'99 (Figs. 111, 112, Table-169).

***Aullodrillus* (Plate-63)**

During the study period from April'98-March'99 the maximum abundance was in pond no. 3 in December'98 (Fig. 113, 114, Table-170) and minimum abundance was in pond no. 1 in September'98 (Fig. 113, 114, Table-170). Similarly, during the study period from April'99-March, 2000 the maximum abundance was in pond no. 7 in April'99 (Fig. 114, 115, Table-171) and minimum abundance was in pond no. 1 in September'99 (Fig. 114, 115,, Table-171).

***Branchiura* (Plate-60)**

During the study period from April'98-March'99 the maximum abundance was in pond no. 3 in March'99 (Fig. 115, Table-172) and minimum abundance was in pond no. 2 in July'98 (Fig. 115, Table-172).

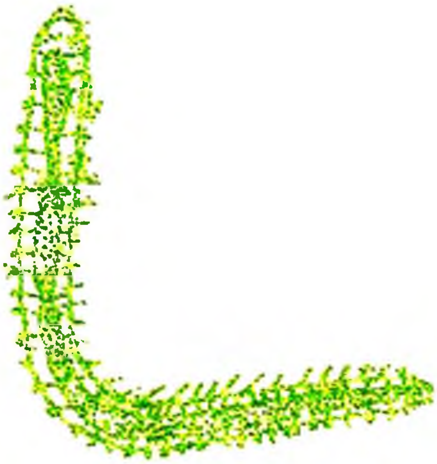


Plate-65 : Nais

Plate-66 : Mesenchytracus

Plate-67 : Chironomus

Plate-68 : Tanypus

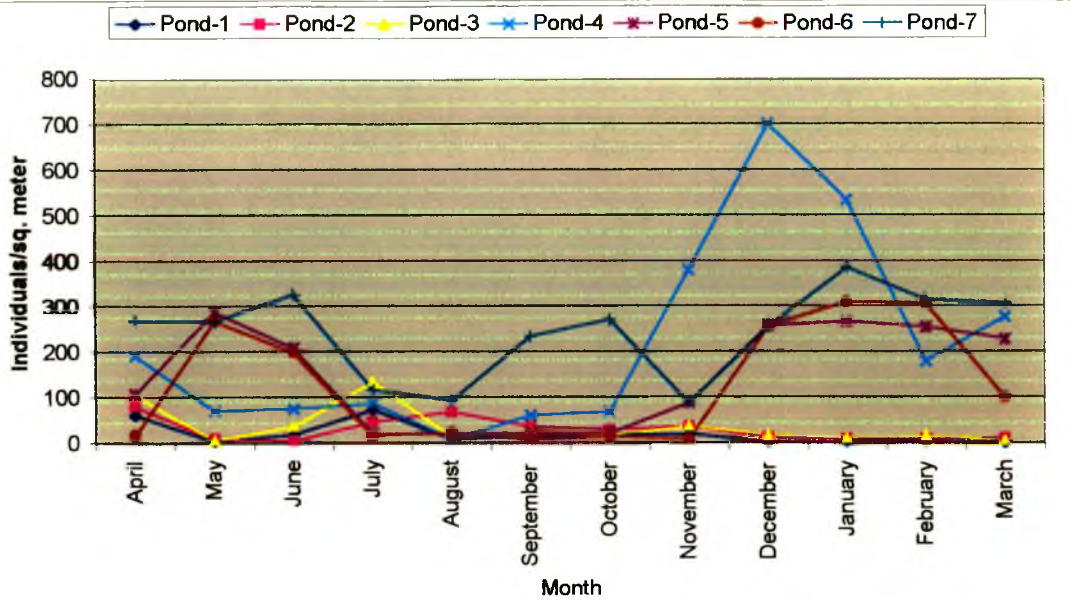


Fig-109 : Monthly fluctuations of *Nais* in different ponds in April '98-March '99

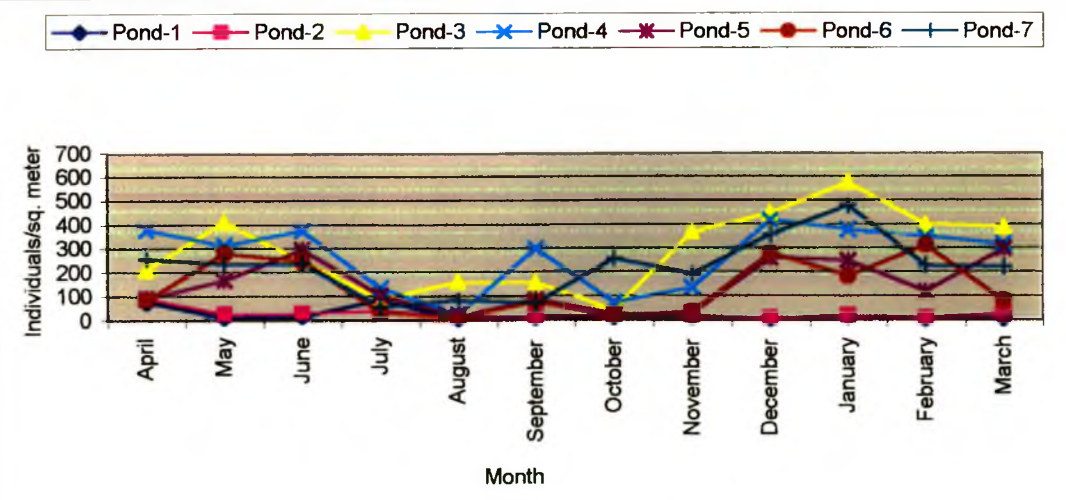


Fig-110: Monthly fluctuations of Nais in different ponds in April'99-March,2000

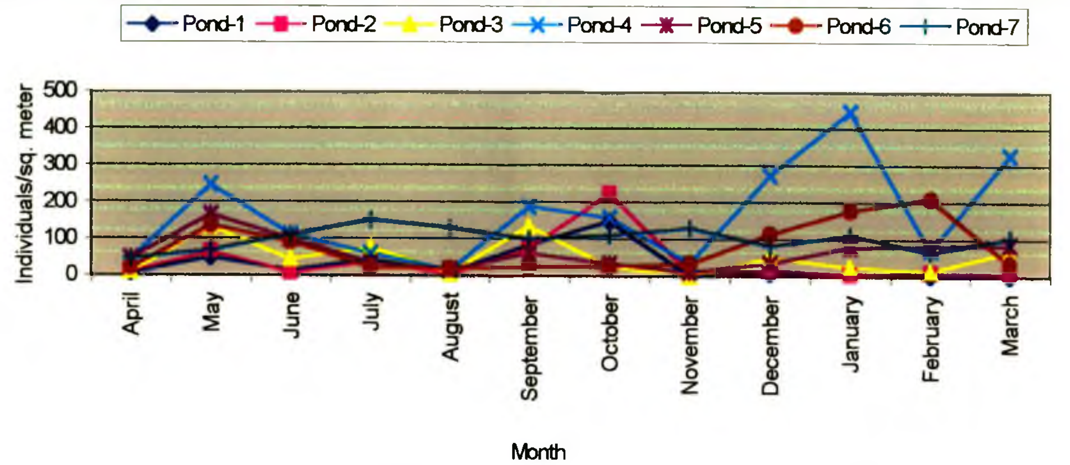


Fig-111 : Monthly fluctuations of *Mesenchytrachus* in different ponds in April '98-March '99

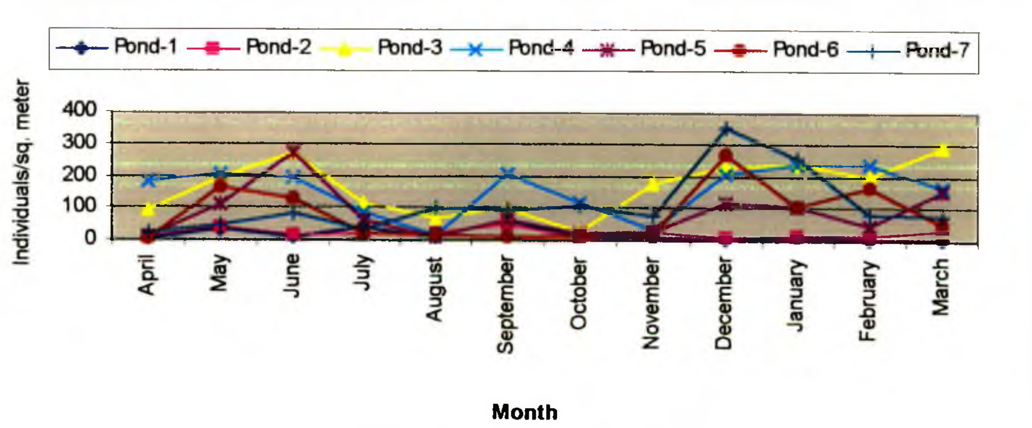


Fig-112 : Monthly fluctuations of *Mesenchytrachus* in different ponds in April '99-March, 2000.

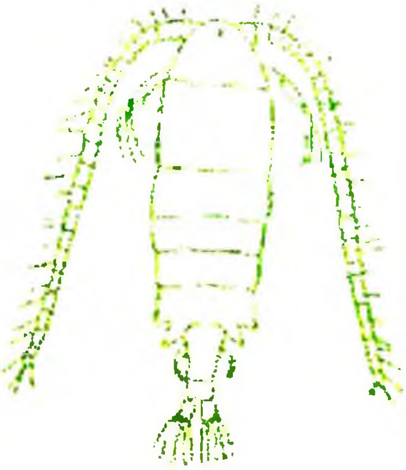


Plate-57 : Diaptomus

Plate-58 : Heterocypris

Plate-59 : Limnordilus

Plate-60 : Branchiura

Plate-61 : Branchiodrilus

Plate-62 : Dero

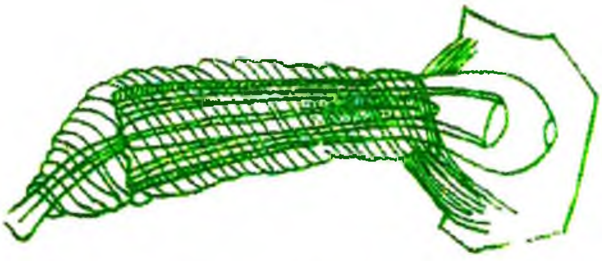


Plate-63 : Aulodrilus

Plate-64 : Tubifex

Similarly, during the study period from April'99-March, 2000 the maximum abundance was in pond no. 7 in April'99 (Fig. 115, Table-173) and minimum abundance was in pond no. 1 in July'99 (Fig. 115, Table-173).

***Limnodrillus* (Plate-59)**

During the study period from April'98-March'99 the maximum abundance was in pond no. 3 in December'98 (Fig. 116, Table-174) and minimum abundance was in pond no. 1 in July'98 (Fig. 116, Table-174). Similarly, during the study period from April'99-March, 2000, the maximum abundance was in pond no. 2 in September'99 (Fig. 116, Table-175) and minimum abundance was in pond no. 2 in November'99 (Fig. 116, Table-175).

***Branchiodrillus* (Plate-61)**

During the study period from April'98-March'99 the maximum abundance was in pond-3 in May'98 (Figs. 117, 118, Table-176) and minimum abundance was in pond no. 1 in December'98 (Figs. 117, 118, Table-176). Similarly, during the study period from April'99-March, 2000 the maximum abundance was in pond no. 7 in March, 2000 (Figs. 117, 118, Table-177) and minimum abundance was in pond no. 1 in August'99 (Figs. 117, 118, Table-177).

Chironomids

During the study period from April'98-March'99 the maximum abundance was in pond no. 3 in April'98 (Table-178) i.e. 59.99% (Table-179) and the minimum abundance was in pond no. 6 in September'98 (Table-178) i.e. 22.73% (Table-179). Similarly, during the study period from April'99-March, 2000 the maximum abundance was in pond no. 7 in Aprl'99 (Table-180) i.e. 52.32% (Table-181) and minimum abundance was in pond no. 7 in January, 2000 (Table-180).

***Chironomus* (Plate-67)**

During the study period from April'98-March'99 the maximum abundance was in pond no. 3 in April'98 (Figs. 119, 120, Table-182) and minimum abundance was in pond no. 1 in November'98 (Figs. 119, 120, Table-182). Similarly, during the study period from April'99-March, 2000 the maximum abundance was in pond no. 7 in April'99 (Figs. 119, 120, Table-183) and minimum abundance was in pond no. 1 in January, 2000 (Figs. 119, 120, Table-183).

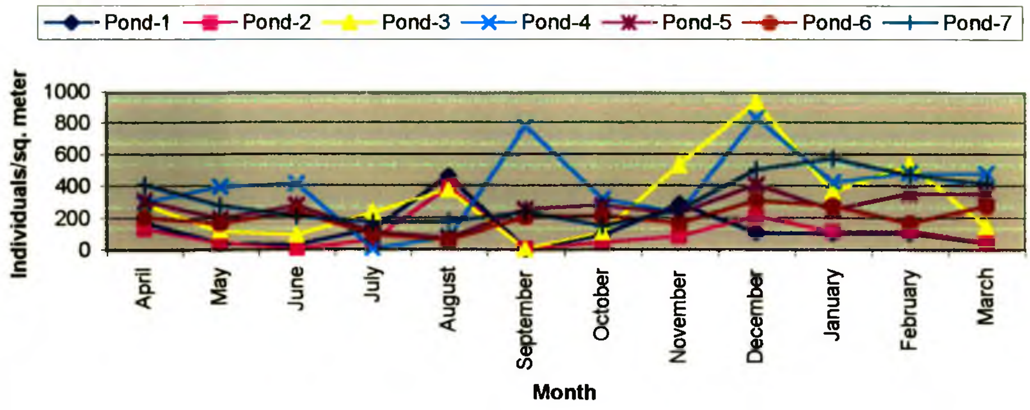


Fig-113 : Monthly fluctuations of *Aullodrillus* in different ponds in April '98-March '99

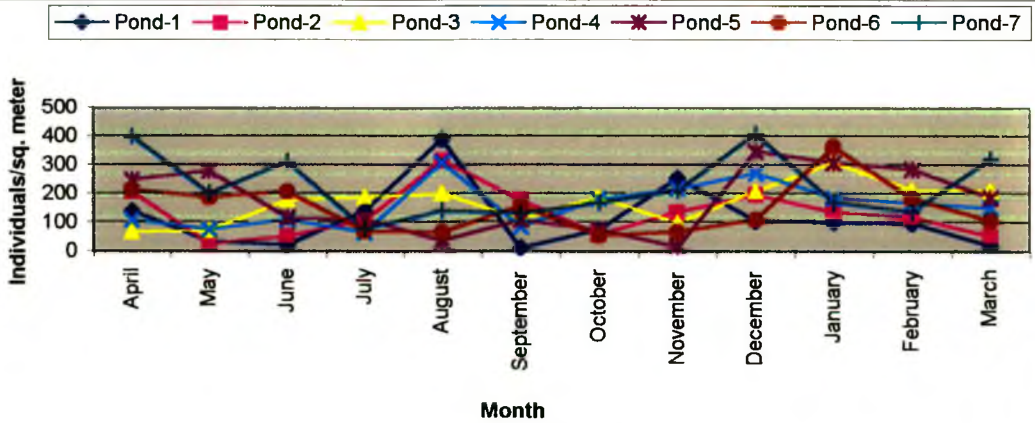


Fig-114 : Monthly fluctuations of *Aullodrillus* in different ponds in April '99-March, 2000.

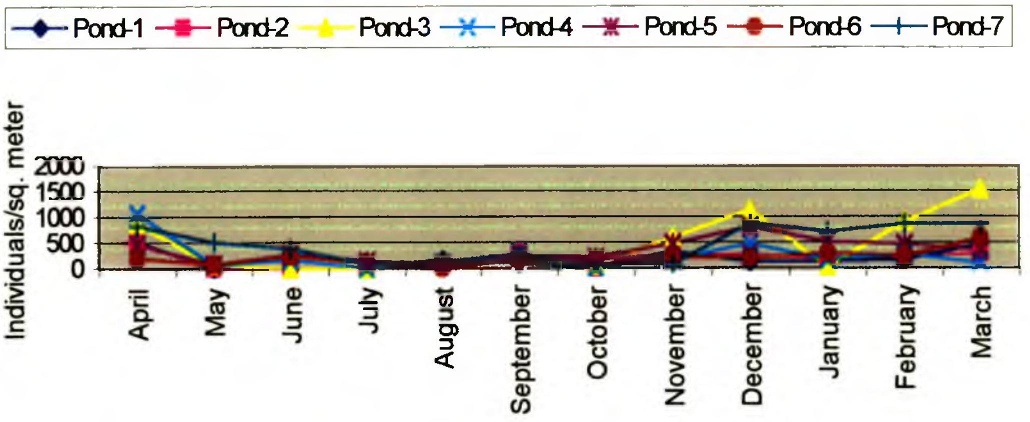


Fig-115 : Monthly fluctuations of *Branchiura* in different ponds in April '99-March '99

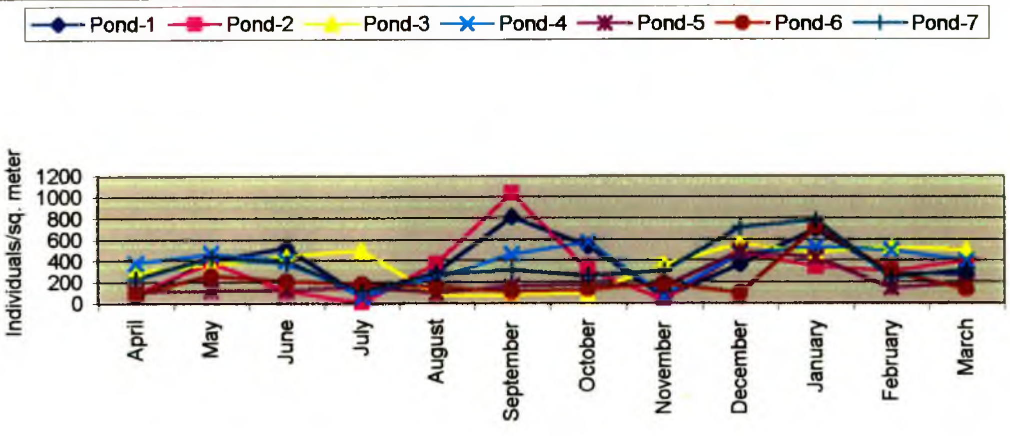


Fig-116 : Monthly fluctuations of *Limnodrillus* in different ponds in April '99-March, 2000

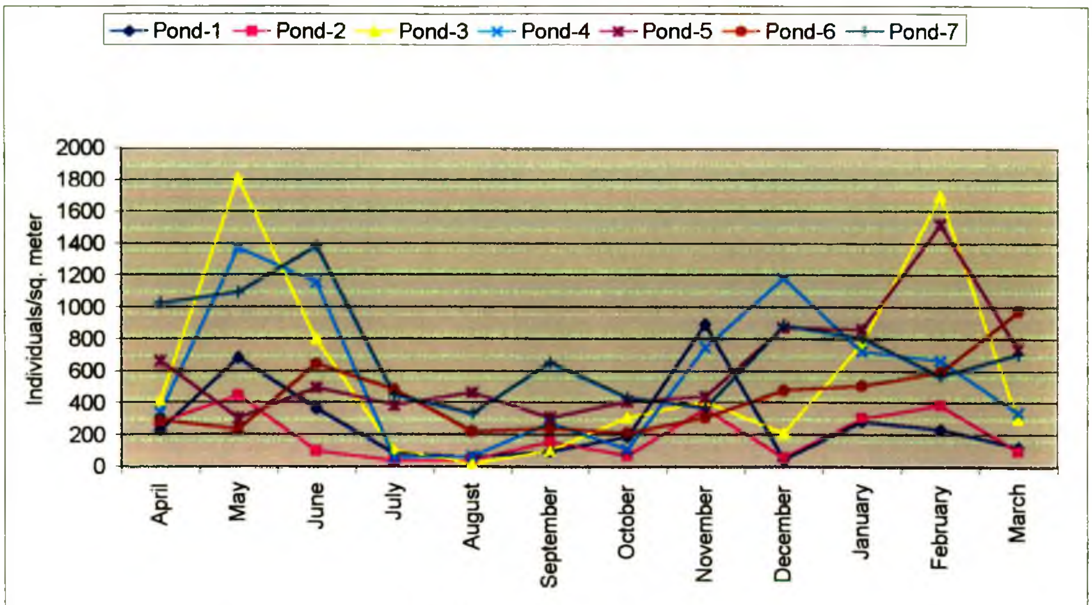


Fig-117 : Monthly fluctuations of *Branchiodrillus* in different ponds in April '98-March '99

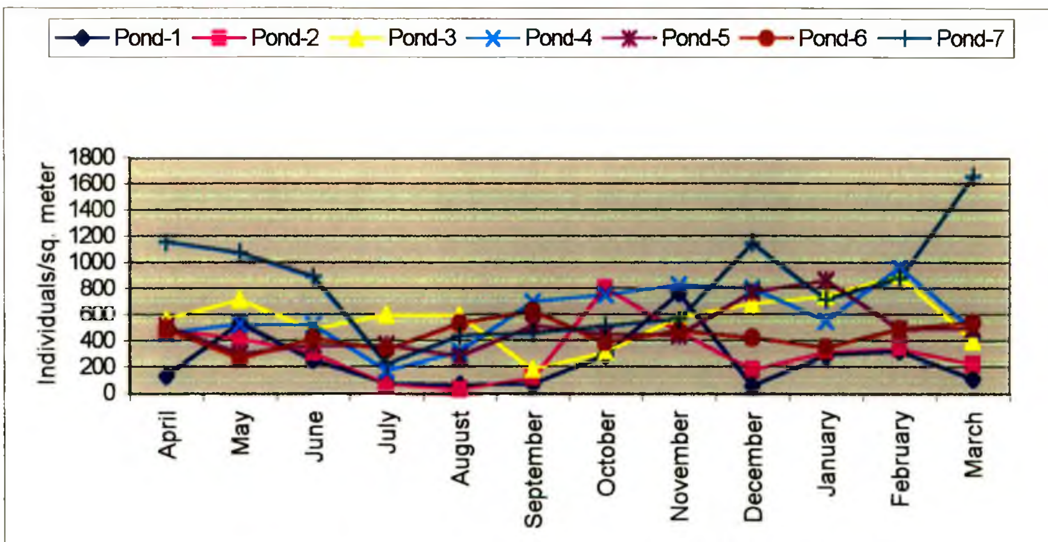


Fig-118 : Monthly fluctuations of *Branchiodrillus* in different ponds in April '99-March, 2000

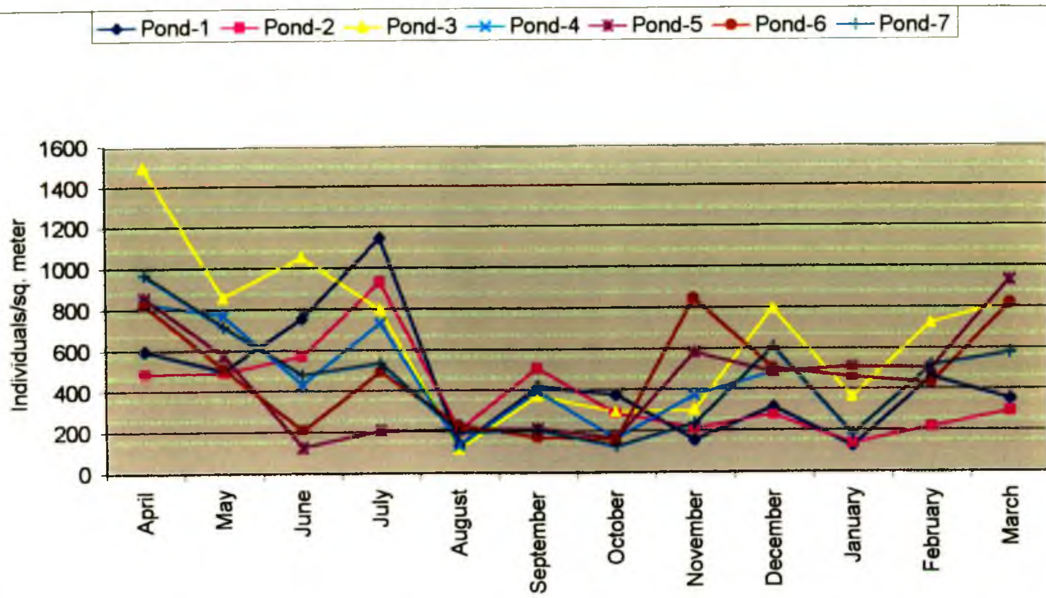


Fig-119 : Monthly fluctuations of *Chironomus* in different ponds in April '98-March '99

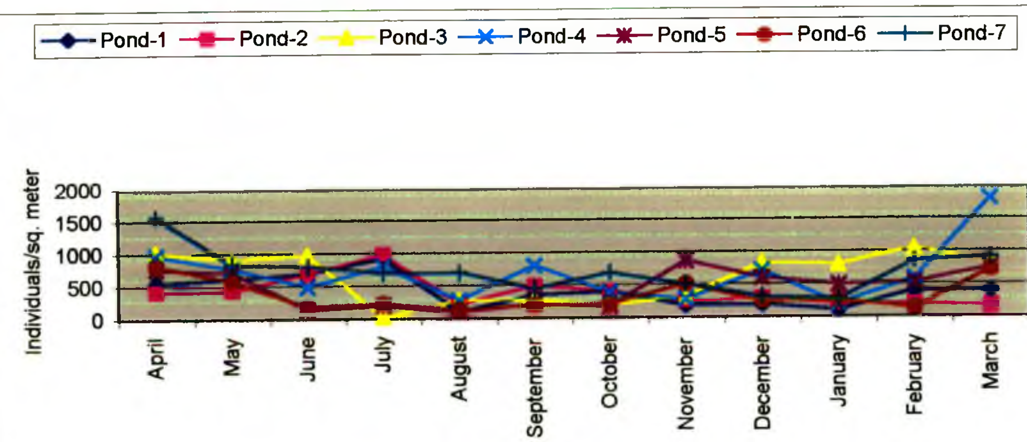


Fig-120 : Monthly fluctuations of *Chironomus* in different ponds in April '99-March, 2000

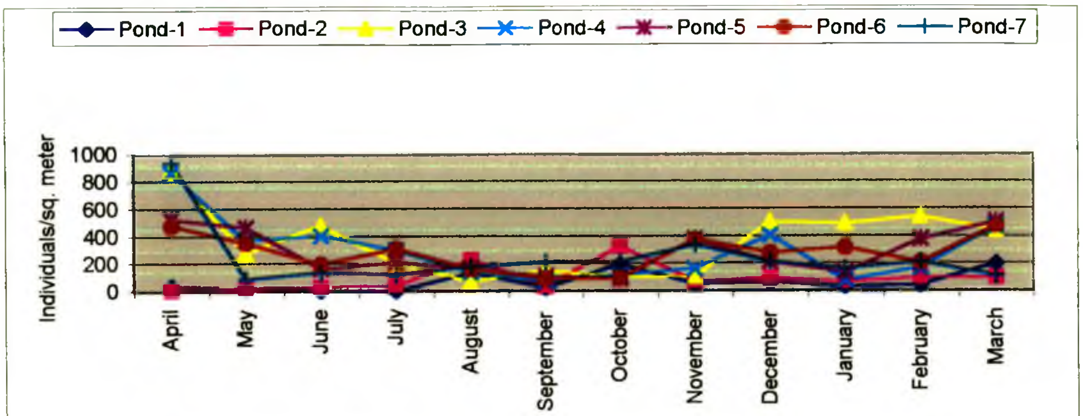


Fig-121 : Monthly fluctuations of *Tanypus* in different ponds in April '99-March, 2000

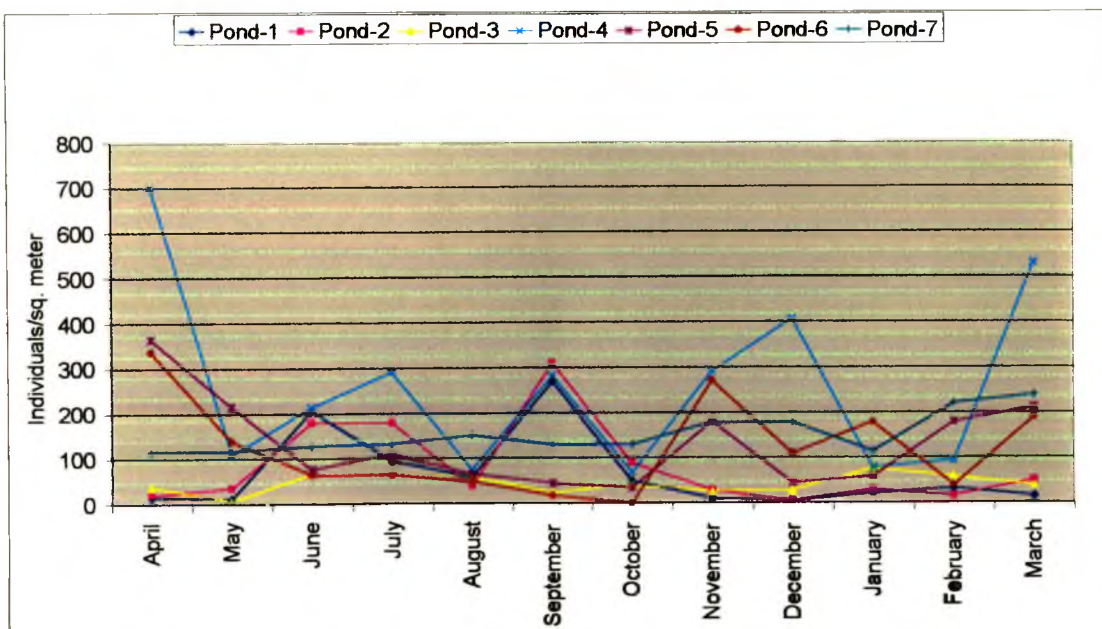


Fig-122 : Monthly fluctuations of *Corynoneura* in different onds in April '98-March, '99

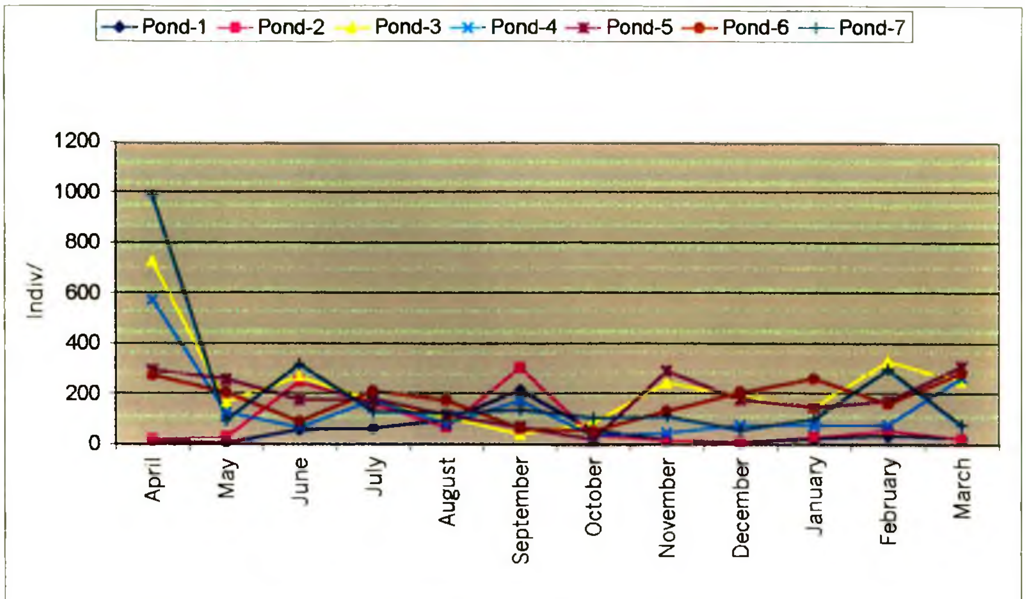


Fig-123 : Monthly fluctuations of *Corynoneura* in different ponds in April '99-March, 2000

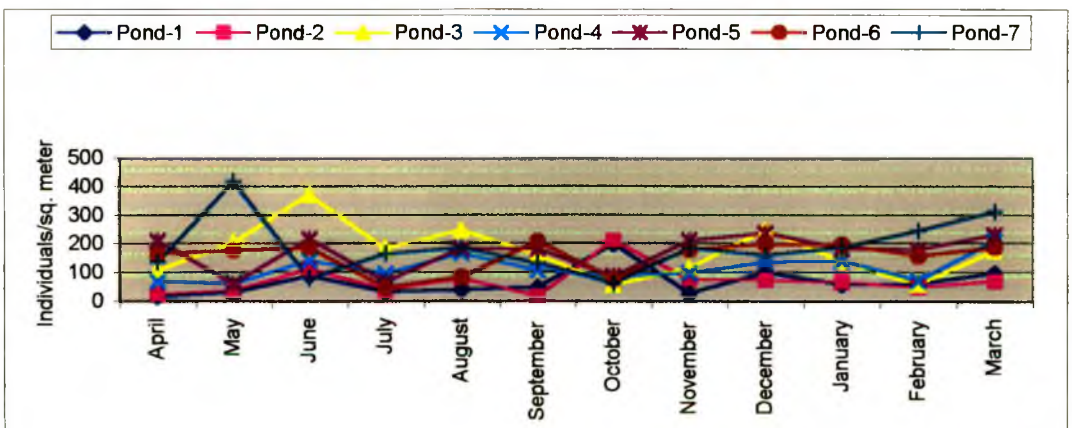


Fig-124 : Monthly fluctuations of *Lamillidens* in different ponds in April '98-March '99

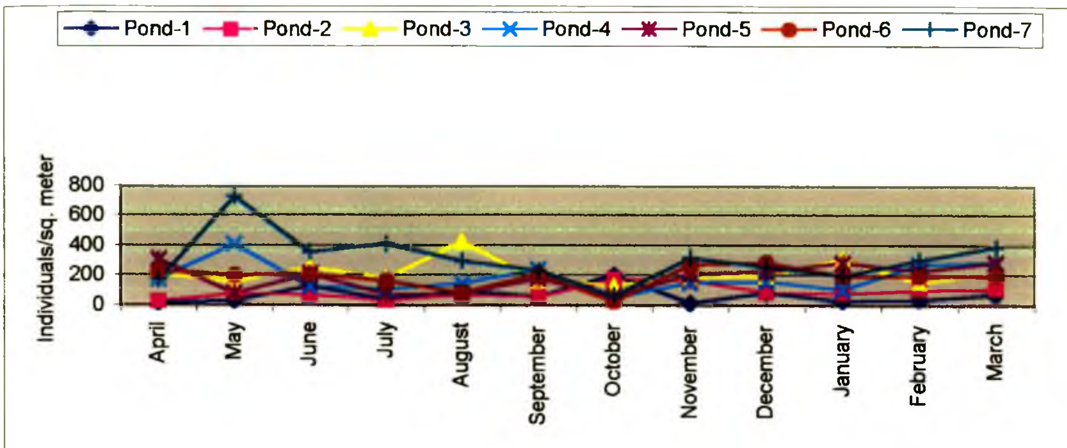


Fig-125 : Monthly fluctuations of *Lamillidens* in different ponds in April '99-March, 2000

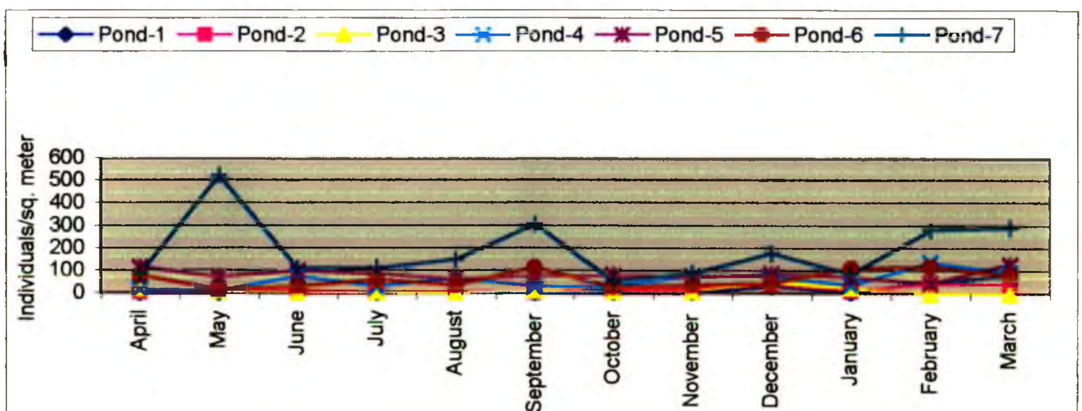


Fig-126 : Monthly fluctuations of *Lymnea* in different ponds in April '98-March '99

Tanypus (Plate-68)

During the study period from April'98-March'99, the maximum abundance was in pond no. 7 in April'98 (Fig. 121, Table-184) and minimum abundance was in pond no. 3 in July'98 (Fig. 121, Table-184). Similarly, during the study period from April'99-March, 2000 the maximum abundance was in pond no. 7 in April'99 (Fig. 121, Table-185) and minimum abundance was in pond no. 1 in June'99 (fig. 121, Table-185).

Corynoneura

During the study period from April'98-March'99 the maximum abundance was in pond no. 4 in April'98 (Figs. 122, 123, Table-186) and minimum abundance was in pond no. 1 in December'98 (Figs. 122, 123, Table-186). Similarly, during the study period from April'99-March, 2000, the maximum abundance was in pond no. 7 in April'99 (Figs. 122, 123, Table-187) and minimum abundance was in pond no. 1 in March'99 (Figs. 122, 123, Table-187).

Pelopia

During the study period from April'98-March'99 the maximum abundance was in pond no. 4 in April'98 (Table-188) and minimum abundance was in pond no. 2 in September'98 (Table-188). Similarly, during the study period from April'99-March, 2000 the maximum abundance was in pond no. 5 in April'99 (Table-189) and minimum abundance was in pond no. 1 in October'99 (Table-189).

Pentaneura

During the study period from April'98-March'99 the maximum abundance was in pond no. 3 in April'98 (Table-190) and minimum abundance was in pond no. 3 in July'98 (Table-190). Similarly, during the study period from April'99-March, 2000 the maximum abundance was in pond no. 7 in April'99 (Table-191) and minimum abundance was in pond no. 2 in June'99 (Table-191).

Mollusca:

During first year of the study period the maximum population abundance was in pond no. 7 i.e. 22.89% (Table- 293) and minimum abundance was in pond no. 3 i. e. 11.92 (Table-293). In the second year of the study period the maximum population abundance was in pond no. 7 i.e. 30.66% (Table- 293) and minimum abundance was in pond no. 3 i. e. 11.08 (Table-293). Mollusca was represented by the following genus.

Lamillidens (Plate-34)

During the study period from April'98-March'99 the maximum abundance was in pond no. 7 in May'98 (Figs. 124, 125, Table-192) and minimum abundance was in pond no. 1 in April'98 (Figs. 124, 125, Table-192).

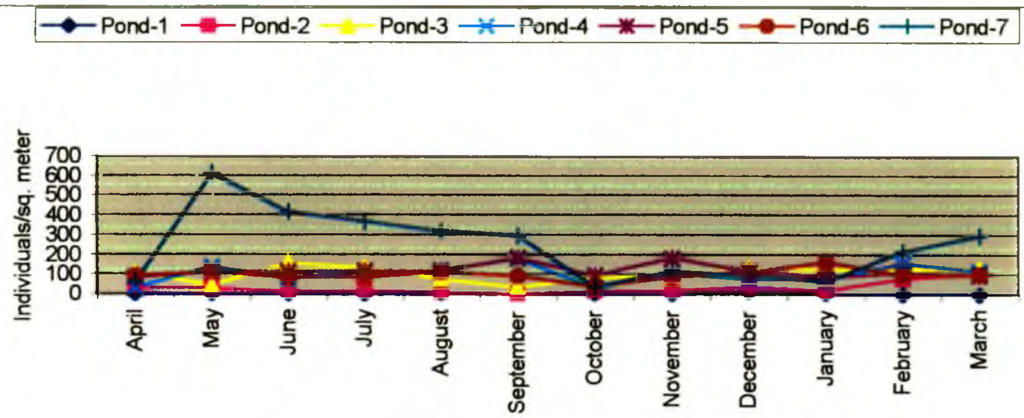


Fig-127 : Monthly fluctuations of *Lymnea* in different ponds in April '99-March, 2000

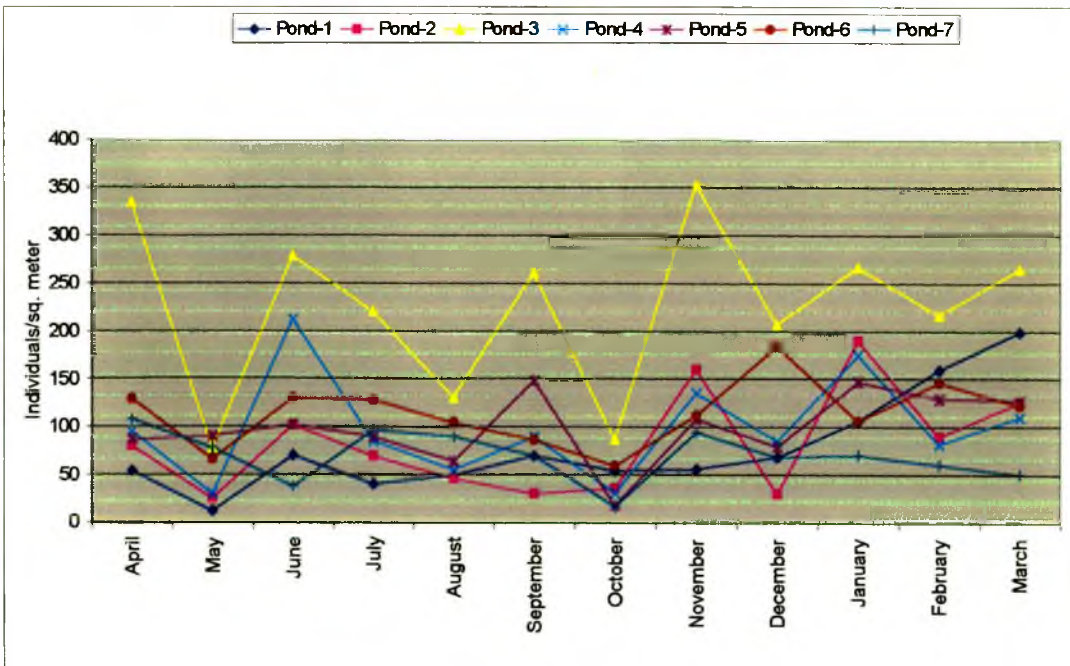


Fig-128 : Monthly fluctuations of *Viviparous* in different ponds in April '98-March '99

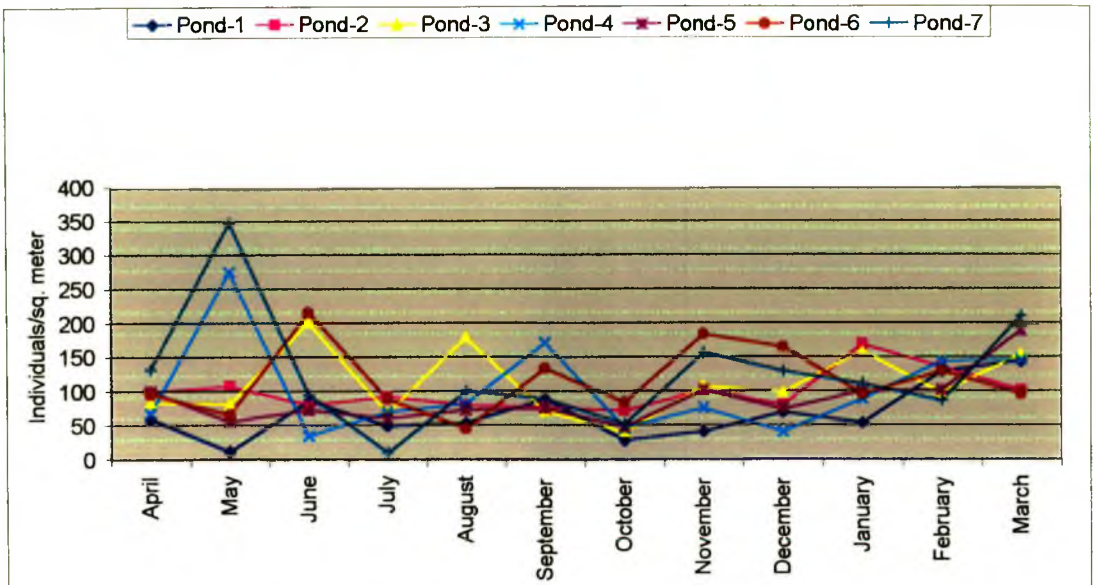


Fig-129 : Monthly fluctuations of *Viviparous* in different ponds in April '99-March, 2000

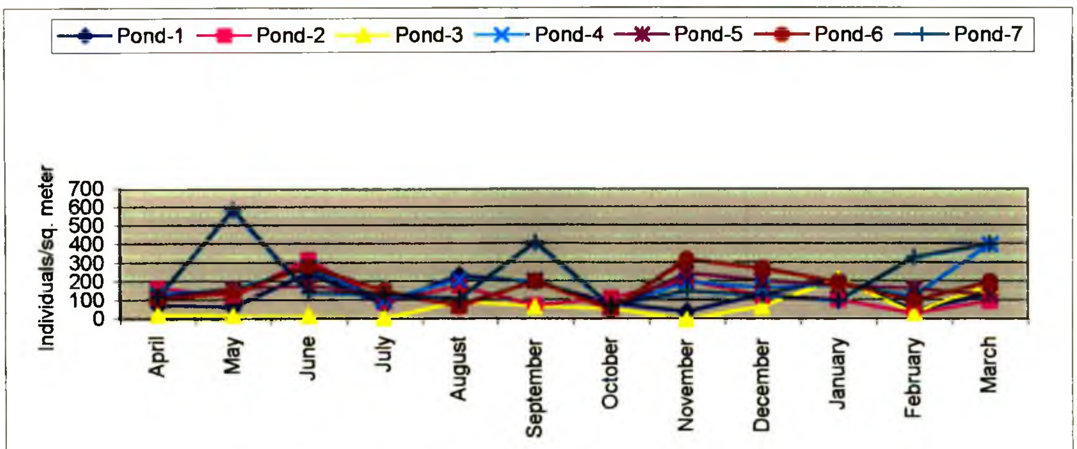


Fig-130 : Monthly fluctuations of *Indoplanorbis* in different ponds in April '98-March '99

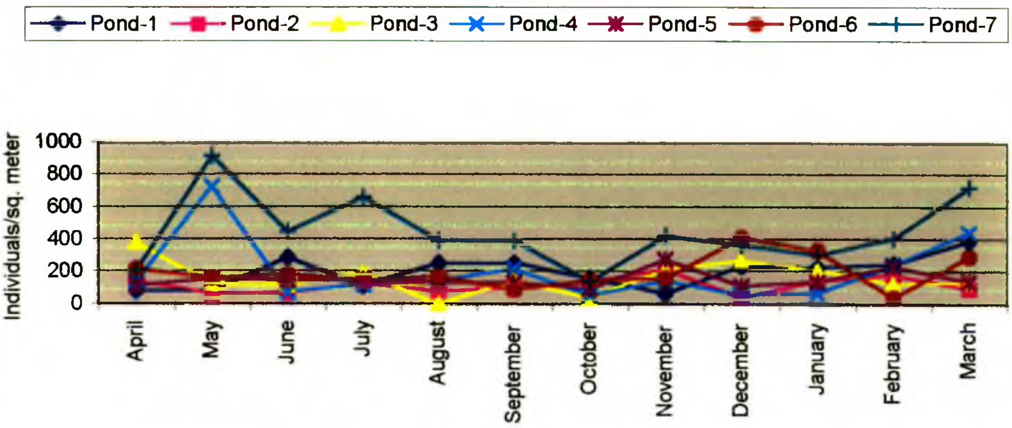


Fig-131 : Monthly fluctuations of *Indoplanorbis* in different ponds in April '99-March, 2000

Similarly, during the research period from April'99-March 2000 the maximum abundance was in pond no. 7 in May'99 (Figs. 124, 125, Table-193) and minimum abundance was in pond no. 1 in April'99 (Figs. 124, 125, Table-193).

Lymnea(Plate-33)

During the study period from April'98-March'99 the maximum abundance was in pond no. 7 in May'98 (Fig. 126, 127, Table-194) and minimum abundance was in pond no. 1 in April'98 (Fig. 126, 127, Table-194). Similarly, during the research period from April'99-March, 2000, the maximum abundance was in pond no. 7 in May'99 (Fig. 126, 127, Table-195) and minimum abundance was in pond no. 1 in April'99 (Fig. 126, 127, Table-195).

Viviparous (Plate-32)

During the study period from April'98-March'99, the maximum abundance was in pond-3 in April'98 (Figs. 128, 129, Table-196) and minimum abundance was in pond no. 1 in May'98 (Figs. 128, 129, Table-196). Similarly, during the study period from April'99-March, 2000 the maximum abundance was in pond no. 7 in May'99 (Figs. 128, 129, Table-197) and minimum abundance was in pond no. 1 in May'99 (Figs. 128, 129, Table-197).

Indoplanorbis (Plate-31)

During the study period from April'98-March'99 the maximum abundance was in pond no. 7 in May'98 (Figs. 130, 131, Table-198) and minimum abundance was in pond no. 3 in November'98 (Figs. 130, 131, Table-198). Similarly, during the study period from April'99-March, 2000 the maximum abundance was in pond no. 7 in June'99 (Figs. 130, 131, Table-199) and minimum abundance was in pond-6 in February, 2000 (Figs. 130, 131, Table-199).

3.6. PLANKTONIC BIOMASS

Four types of feed samples were applied in seven ponds in two years study period. The result of the total planktonic biomass measured during the study period in several ponds in constant wet weight basis was mentioned in Table nos. 200, 201. It observed (Table-200) that the highest value of planktonic biomass in the period from April'98-March'99 was 76 mg/l in pond no. 7 where feed sample 4 was applied. The lowest value in that period was 16.1 mg/l in pond no. 2 (Table-200) in April'98 where feed sample 1 was applied. Similarly, during the period from April'99-March'2000 the highest value was 78 mg/l in pond no. 7 (Table-201) in May'99 where feed sample 4 was applied. The lowest abundance in that period was 14.8 mg/l in pond no. 2 (Table-201) in October'99 where feed sample 1 was applied. The variations in the plankton production between different months were significant (Table: 202, 203). The dry weight of plankton was recorded on monthly basis. During the period from April'98-March'99 the maximum abundance was 7.98 mg/l in pond no. 3 (Table-202) in June'98 where feed sample-3 was applied. The minimum abundance was 2.55 mg/l in pond no.1 (Table-202) in February'99 where feed sample 1 was applied. Similarly, during the period from April'99-March, 2000 the maximum abundance was 7.18 mg/l in pond no. 7 (Table-203) in December'99 where feed sample 4 was applied. The minimum abundance was 2.12 mg/l in pond no. 2 (Table-203) in February, 2000 where feed sample-2 was applied.

3.7 PROXIMATE ANALYSIS OF DIFFERENT FEED SAMPLES

The proximate composition i.e. moisture, ash, crude fibre, protein, fat, carbohydrate, caloric contents of four feed samples were done (Table-253 to 266). In addition, estimation of minerals namely i.e. calcium, magnesium, sodium, potassium, iron, zinc, copper, total phosphorus was done (Table-267 to 276)

Moisture Content

The moisture content in feed sample 1 in semi-solid form was 58.96%, in feed sample 2 in liquid form was 81.31%, in feed sample 3 in laboratory dry form was 10.37% and in feed sample 4 in laboratory dry form was 10.02%. Where as, in commercially dry form, the moisture contents in all the four feed samples was zero (Table-254).

Ash Content

In case of feed sample 1 in semi-solid form the ash content was 6.51%, in feed sample 2 in liquid form was 3.28%, in feed sample 3 in laboratory dry form it was 32.35% and in feed sample 4 in laboratory dry form it was 9.94% (Table-255). Where as, in commercially dry form the ash content was in case of feed sample 1 was 15.36%, in feed sample 2 was 36.09%, in feed sample 3 was 11.04% and in feed sample 4 was 17.54% (Table-256).

Crude Fibre Content

The amount of crude fibre, in case of feed sample 1 in semi-solid form was 1.88%, in feed sample 2 in liquid form was .37%, in feed sample 3 at laboratory dry form was 10.28% and in feed sample 4 in laboratory dry form was 1.80% (Table-257). Where as, in commercial dry form the crude fiber contents in feed sample 1 was 4.58%, in feed sample 2 was 11.28%, in feed sample 3 was 2% and in feed sample 4 was 1.97% (Table-258).

Protein Content

The protein content in feed sample 1 in semi-solid form was 12.48%, in feed sample 2 in liquid form was 1.82%, in feed sample 3 in laboratory dry form was 9.10% and in feed sample 4 in laboratory dry form was 19.01% (Table-259). Similarly, in commercially dry form the protein content in feed sample 1 was 30.40%, in feed sample 2 was 10.15%, in feed sample 3 was 21.12% and in feed sample 4 was 9.73% (Table-260).

Fat Content

The amount of fat content in feed sample 1 in semi-solid form was 2.82%, in feed sample 2 in liquid form was 0.85%, in feed sample 3 in laboratory dry form was 1.65% and in feed sample 4 in laboratory dry form was 13.05% (Table-261). Where as, in commercially dry form the fat content in feed sample 1 was 6.87%, in feed sample 2 was 1.84%, in feed sample 3 was 14.50% and in feed sample 4 was 4.35% (Table-262).

Carbohydrate Content

The amount of carbohydrate content in feed sample 1 in semi-solid form was 17.35%, in feed sample 2 in liquid form was 12.74%, in feed sample 3 in laboratory dry form was 36.25% and in feed sample 4 in laboratory dry form was 46.18% (Table-263). Where as, in commercially dry form the amount of carbohydrate in feed sample 1 was 42.27%, in feed sample 2 was 40.44%, in feed sample 3 was 51.32% and in feed sample 4 was 68.16% (Table-264).

Caloric Content

The amount of caloric content in feed sample 1 in semi-solid form was 144 K.cal., in feed sample 2 in liquid form was 65 K.cal., in feed sample 3 was 196 K.cal. and in feed sample 4 was 378 K.cal. (Table-265) Where as, in commercially dry form the caloric content in feed sample 1 was 350 K.cal., in feed sample 2 was 218 K.cal., in feed sample 3 was 420 K.cal. and in feed sample 4 was 347 K.cal. (Table-266).

MINERALS CONTENT

Calcium (Ca^+) Content

The amount of calcium content in feed sample 1 at semi-solid form was 295 mg/100 g, in feed sample 2 in liquid form was 92 mg/100 g, in feed sample 3 in laboratory dry form was 290 mg/100 g and in feed sample 4 in laboratory dry form was 296 mg/100 g (Table-267). Where as, in commercially dry form the amount of Ca^+ contents in feed sample 1 was 718 mg/100 g, in feed sample 2 was 323 mg/100 g, in feed sample 3 was 307 mg/100 g and in feed sample 4 was 492 mg/100 g (Table-268).

Magnesium (Mg^+)

The amount of Mg^+ was in case of feed sample 1 in semi-solid form was 276 mg/100 g, in feed sample 2 in liquid form was 78 mg/100 g, in feed sample 3 in laboratory dry form was 266 mg/100 g and in feed sample 4 in laboratory dry form was 269 mg/100 g (Table-269). Where as, in commercially dry form the amount of Mg^+ in feed sample 1 was 672 mg/100 g, in feed sample 2 was 296 mg/100 g, in feed sample 3 was 253 mg/100 g and in feed sample 4 was 417 mg/100 g (Table-270).

Zinc (Zn^+)

The amount of Zn^+ was in feed sample 1 in semi-solid form was 4.78 mg/100 g, in feed sample 2 in liquid form was 0.55 mg/100 g, in feed sample 3 in laboratory dry form was 5.13 mg/100 g and in feed sample 4 in laboratory dry form was 5.57 mg/100 g (Table-271). Where as, in commercially dry form the amount in feed sample 1 was 11.64 mg/100 g, in feed sample 2 was 5.72 mg/100 g, in feed sample 3 was 5.37 mg/100 g and in feed sample 4 was 2.94 mg/100 g (Table-272).

Iron (Fe^+)

The amount of Iron in feed sample 1 in semi-solid form was 8.90 mg/100 g, in feed sample 2 in liquid form was 2.77 mg/100 g, in feed sample 3 in laboratory dry form was 7.69 mg/100 g and in feed sample 4 in laboratory dry form was 9.75 mg/100 g (Table-273). Where as, in commercially dry form feed sample 1 was 21.68 mg/100 g, in feed sample 2 was 8.57 mg/100 g, in feed sample 3 was 9.92 mg/100 g and in feed sample-4 was 14.82 mg/100 g (Table-274).

Copper (Cu^+)

The amount of copper in feed sample 1 in semi-solid form was 0.84 mg/100 g, in feed sample 2 in liquid form was 0.16 mg/100 g, in feed sample 3 in laboratory dry form was 0.97 mg/100 g and in feed sample 4 in laboratory dry form was 0.90 mg/100 g (Table-275). Where as, in commercially dry form the amount of copper in feed sample 1 was 2.04 mg/100 g, in feed sample 2 was 1.08 mg/100 g, in feed sample 3 was 0.92 mg/100 g and in feed sample 4 was 0.85 mg/100 g (Table-276).

3.8. STUDY OF FISH GROWTH IN DIFFERENT PONDS

The considered fish species in the present investigation were Silver carp, Catla, Rui, Mrigal and Carpio. The Silver Carp and Catla as surface feeder fish, the surface fish population was adjusted in the first year at the ratio of 50% basis and in the second year at the ratio of 80% and 20% basis. Rui as column feeder fish. Mrigal and Carpio as the bottom feeder fish, the bottom fish population was adjusted in the first year at 50% basis and in second year at 30% and 70% basis. The ratio between surface, column and bottom feeder fish in the first year was 4:2:4 and in second year was 3:2:5. During the study the column feeder fish species remained static but there was a change in the surface and bottom feeder fish population in both the years. Different feed sample were applied to different ponds at 2.5% of the body weight basis of fish. All the feeds were broadcast to the ponds (Plate 17). The monthly growth rate of selective fish species were observed (Plate 18, 19). The population numbers for all the ponds remained static for both the year. The fish population for pond nos. 1, 2, 3, 4, 5, 6 and 7 was 5500 fish, 5600 fish, 5800 fish, 6120 fish, 6000 fish, 6000 fish, 5200 fishes per pond respectively and per hacter per year it was 15980 fish, 15720 fish, 15918 fish, 15910 fish, 15700 fish, 15770 fish, 15595 fishes respectively (Table- 204).

Silver carp *(Hypopthalmichthys molitrix)* (Plate-20, 21)

Silver Carp being the surface feeder fish had the fastest growth among the fish species stocked. In case of pond no. 1 (Table-205) in the study period during April'98-March'99 the initial weight of Silver carp was 7 g and finally in March'99 it attained 180 g body weight. Per day growth rate in May was 0.19 g/day, in Ocotber'98 was 0.67 g/day, in December'98 was 0.25 g/day. The maximum increase of body weight was in September'98, i.e. 33 g/month and 1.10 g/day. Similarly during the study period in case of pond-2 (Table-206), pond-3 (Table-207), pond-4 (Table-208), pond-5 (Table-209), pond-6 (Table-210) and pond-7 (Table-211) the initial body weights were 6 g, 7 g, 8 g, 6 g, 8 g, 10 g respectively and the final body weights were 191 g, 611 g, 648 g, 802 g, 813 g, 901 g respectively. And the maximum increase of growth in pond nos. 2, 3, 4, 5, 6, 7 was in Ocotober'98 i.e. 0.96 g/day, 3.48 g/day, 3.58 g/day, 3.74 g/day, 3.87 g/day, 4.12 g/day respectively. During the period April'99-March, 2000 in case of pond-1 (Table-205) the initial average weight of Silver Carp was 6 g and after one year in March, 2000 the final weight was 178 g here the maximum increase of body weight was in September'98 i.e. 1.03 g/day respectively. Similarly in the period in case of pond nos. 2, 3, 4, 5, 6, 7 (Table-212) the initial average weights were 5 g, 8 g, 6 g, 7 g, 6 g, 8 g respectively and final weight were 185 g, 614 g, 641 g, 796 g, 855 g, 932 g respectively. And maximum increase of body weight was in October'98 in different ponds i.e. 1.03 g/day, 3.58 g/day, 3.74 g/day, 3.70 g/day, 4.03 g/day, 4.25 g/day respectively (Table-206, 207, 208, 209, 210, 211). In both the year by applying feed sample 1 in pond nos. 1, 2 the maximum body weight of Silver carp ranged from 178 g to 191 g. By applying feed sample 2 in pond nos. 3, 4 the maximum body weight ranged from 611 g to 648 g. By applying feed sample 3 in pond nos. 5, 6 the maximum body weight ranged from 796 g to 855 g. By applying feed sample 4 in pond no. 7 the maximum body weight ranged from 901 g to 932 g (Table- 212).

Catla *(Catla catla)* (Plate-22, 23)

Catla was considered as surface feeder fish. In the studied period during April'98-March'99 in case of pond no. 1 the initial body weight of Catla was 5 g and finally it attained 90 g. The maximum growth was in October'98 i.e. 0.46 g/day (Table-213). Similarly in that period in case of pond nos. 2 3, 4, 5, 6, 7 the initial body weights were 5 g, 6 g, 7 g, 6 g, 6 g, 6 g respectively. The final body weights were 86 g, 311 g, 320 g, 340 g, 308 g, 370 g respectively (Table-220), the maximum increase of growth in pond nos. 2, 3, 5, 6 was in the month of October'98 i.e. 0.46 g/day, 1.53 g/day, 1.73 g/day, 1.53 g/day respectively, in pond nos. 4, 7 in March'99 i.e. 1.60 g/day, 1.96 g/day respectively (Table nos. 214, 215, 216, 217, 218, 219). Where as in the period April'99-March, 2000 in case of pond no. 1 the initial weight of Catla was 6 g and finally it attained 80 g, here the maximum increase of body weight was in October, 2000 i.e. 0.40 g/day (Table-213). Similarly, in the period in case of pond nos.-2, 3, 4, 5, 6, 7 the initial body weights were 6 g, 6 g, 6 g, 6 g, 7 g, 7 g respectively and final body weights were 87 g, 301 g, 333 g, 316 g, 320 g, 380 g respectively (Table-220). And the maximum increase of body weight was in October'99 i.e. 0.43 g/day, 1.43 g/day, 1.66 g/day, 1.66 g/day, 1.63 g/day, 1.80 g/day respectively (Table nos. 214, 215, 216, 217, 218, 219). In both the year by applying feed sample 1 in pond nos. 1, 2 the maximum body weight of Catla ranged from 86 g to 90 g. By applying feed sample 2 in pond nos. 3, 4 the maximum body weight ranged from 311 g to 333 g. By applying feed sample 3 in pond nos. 5, 6 the maximum body weight ranged from 320 g to 340 g. By applying feed sample 4 in pond no. 7 the maximum body weight ranged from 370 g to 380 g (Table- 220).

Rui *(Labeo rohita)* (Plate-24)

Rui was considered as column feeder fish. In case of pond no. 1 (Table-221) in the study period during April'98-March'99 the initial weight was 3 g and final weight was 85 g, the growth rate in May'98 was 0.10 g/day, in July'99 was 0.16 g/day and in March'99 was 0.40 g/day. The maximum grwoth was in October'98 i.e. 0.46 g/day. Similarly in that period in case of pond nos. 2, 3, 4, 5, 6, 7 the initial body weights were 3 g, 6 g, 5 g, 7 g, 6 g, 7 g respectively and the final body weights were 80 g, 230 g, 235 g, 301 g, 280 g, 335 g respectively (Table-228). And the maximum increase of growth was in the month of October'98 i.e. 0.43 g/day, 1.26 g/day, 1.30 g/day, 1.56 g/day, 1.50 g/day, 1.66 g/day respectively (Table nos. 222, 223, 224, 225, 226, 227). Where as in the period April'99-

March, 2000 in case of pond no.1 the initial weight of Rui was 4 g and final body weight was 83 g, here the maximum increase of body weight was in October'99 i.e. 0.46 g/day. Similarly in the period m case of pond nos. 2, 3, 4, 5, 6, 7 the initial weights were 4 g, 7 g, 6 g, 7 g, 7 g, 6 g respectively and final body weights were 82 g, 218 g, 237 g, 258 g, 291 g, 338 g respectively (Table-228). And the maximum increase of body weight was in October'99 i.e. 0.50 g/day, 1.23 g/day, 1.20 g/day, 1.40 g/day, 1.56 g/day, 1.66 g/day respectively. In both the year by applying feed sample 1 in pond nos. 1, 2 the maximum body weight of Rui ranged from 82 g to 85 g. By applying feed sample 2 in pond nos. 3, 4 the maximum body weight ranged from 230 g to 237 g. By applying feed sample 3 in pond nos. 5, 6 the maximum body weight ranged from 291 g to 301 g. By applying feed sample 4 in pond no. 7 the maximum body weight ranged from 335 g to 338 g (Table- 228).

Carpio *(Cyprinus carpio)* (Plate-26)

Carpio was considered as a bottom feeder fish species. In the studied period during April'98-March'99 in case of pond-1 the initial body weight of Carpio was 6 g and after rearing it attained 171 g body weight, the maximum increase of body weight was in September'98 i.e. 1.16 g/day (Table-237). Similarly, in the period, in case of pond nos. 2, 3, 4, 5, 6, 7 the initial body weights were 6 g, 6 g, 5 g, 7 g, 6 g, 7 g respectively and the final body weights were 175 g, 480 g, 490 g, 527 g, 508 g, 690 g respectively (Table-244).

Plate-17 : Fish feed broadcast to the researched pond

Plate-18 : Fish sampling in the researched pond

Plate-19 : Fish sampling in the researched pond

Plate-20 : Silver carp (Hypophthalmichthys molitrix)

Plate-21 : Silver carp
(Hypophthalmichthys molitrix)

Plate-22 : Catla
(Catla catla)

Plate-23 : Catla
(Catla catla)

Plate-24 : Rui
(Labeo rohita)

And the maximum increase of the body weight in pond nos. 2, 5, 6 was i.e. 1.03 g/day, 2.33 g/day, 2.36 g/day, in pond-3, 4, 7 the growth was 2.20 g/day, 2.33 g/day, 3.83 g/day respectively (Table nos. 238, 239, 240, 241, 242, 243). Where as in that period April'99-March, 2000 in case of pond no.1 the initial weight of Carpio was 7 g and finally it attained 185 g body weight here the maximum increase of body weight was in September'99 i.e. 1.10 g/day (Table-237). Similarly in that period in case of pond nos. 2, 3, 4, 5, 6, 7 the initial body weights of Carpio were 7 g, 5 g, 6 g, 5 g, 7 g, 6 g respectively and finally it attained 179 g, 470 g, 488 g, 503 g, 506 g, 650 g body weight respectively (Table-244). And the maximum increase of body weight in pond nos. 2, 5, 6 was 1.00 g/day, 2.33 g/day, 2.38 g/day and in pond nos. 3, 5, 7 the maximum growth rate was in October'99 i.e. 2.20 g/dday, 2.40 g/day, 3.50 g/day respectively (Table nos. 238, 239, 240, 241, 242, 243). In both the year by applying feed sample 1 in pond nos. 1, 2 the maximum body weight of Carpio ranged from 179 g to 185 g. By applying feed sample 2 in pond nos. 3, 4 the maximum body weight ranged from 480 g to 490 g. By applying feed sample 3 in pond nos. 5, 6 the maximum body weight ranged from 508 g to 527 g. By applying feed sample 4 in pond no. 7 the maximum body weight ranged from 658 g to 690 g (Table- 244).

Mrigal ***(Cirrhinus mrigala)*** (Plate-25)

Mrigal was the bottom feeder fish. In case of pond no. 1 (Table-229) in the study year during April'98-March'99 the initial weight of Mrigal was 4 g and finally it attained 132 g body weight. The grwoth rate was .16 g/day, in May'98 and .40 g/day in March'99. The growth rate was maximum in October'98 i.e. 22 g/month and 0.73 g/day. Similarly in this period in case of pond nos. 2, 3, 4, 5, 6, 7 the initial body weights were 3 g, 6 g, 6 g, 6 g, 7 g, 7 g respectively and the final body weights were 107 g, 389 g, 360 g, 401 g, 390 g, 435 g respectively (Table-236). And the maximum increase of growth was in the month of October'98. The growth rate was 0.60 g/day, 1.63 g/day, 1.66 g/day, 1.90 g/day, 1.80 g/day, 2 g/day respectively (Table nos. 230, 231, 232, 233, 234, 235). Where as, in the period April'99-March, 2000 in case of pond no.1 the initial average weight of Mrigal was 5 g and finally it attained 125 g here the maximum increase of body weight was, in October'99 i.e. 23 g/month and 0.76 g/day. Similarly in that period in case of pond nos. 2, 3, 4, 5, 6, 7, the initial average weights were 4 g, 7 g, 7 g, 7 g, 6 g, 6 g respectively and after rearing the final weights were 113 g, 360 g, 370 g, 392 g, 403 g, 425 g respectively (Table-236). The growth rate was maximum in October'99 in pond no. 2 i.e. 0.63 g/day, pond no. 3 was 1.73 g/day, in pond no. 5 was 1.83 g/day, in pond no. 6 was 1.83 g/day and in March, 2000 i.e. in pond no. 4 was 1.76 g/day, in pond no.7 was 1.93 g/day respectively (Table nos. 230, 231, 232, 233, 234, 235). In both the year by applying feed sample 1 in pond nos. 1, 2 the maximum body weight of Mirgal ranged from 113 g to 132 g. By applying feed sample 2 in pond nos. 3, 4 the maximum body weight ranged from 370 g to 389 g. By applying feed sample 3 in pond nos. 5, 6 the maximum body weight ranged from 401 g to 403 g. By applying feed sample 4 in pond no. 7 the maximum body weight ranged from 425 g to 435 g (Table- 236).

3.9. ESTIMATION OF FISH PRODUCTION

During the study period pond wise total annual catch, mortality, survival rate were as follows:

In case of pond-1 (Table-245):

During first year the total fish population was 5500 specimes in the first year. Total catch was 4290 fish, 605 specimes of which was counted as mortality and 605 specimens were un-fished. The average weight of fish was 131.60 g/year. 561 kg was harvested annually at the rate of 1650 kg/ha. In the second year (Table-245), the total number of fish was static, totally 4360 specimens were caught, 568 piece of which was un-fished and 572 piece was considered as mortality. The average growth of fish in that pond was 130.20 g/year. The yield was 567.12 kg/year i.e. 1668 kg/ha.

In case of pond-2 (Table-246):

The total fish population was 5600 in number in the first year, 4398 specimens were harvested, 503 specimens were un-fished and 693 specimens were of mortality consideration. The average growth of fish was 127.8 g/year. The total yield was 560.35 kg/year i.e. 1601 kg/year/ha. Similarly, in the second year (Table-246), the population number was static, 4447 specimens were caught, 729 specimens were un-fished and 424 specimens were of mortality consideration. The total yield was 574 kg/year i.e. 1640 kg/year/ha.

In case of pond-3 (Table-247):

In first year the total number of fish was 5800 specimens, among them 4561 specimens were harvested, 501 specimens were un-fished and 744 numbers were of mortality consideration. Total yield from that pond was 1851.48 kg/year. i.e. 5143 kg/ha/year. Similarly in the second year (Table-247) the population number was static, but the number of fish harvested was 4741 numbers, 566 numbers were un-fished and 493 numbers were of mortality consideration. The average growth of fish in that pond was 392.6 g, the yield was 1818 kg/year i.e. 5050 kg/ha/year.

In case of pond-4 (Table-248):

The total number of fish population was 6120 number in the first year April'98-March'99, 4698 numbers were caught, 590 numbers were un-fished and 832 numbers were of mortality consideration. From that pond the yield was 1947.88 kg i.e. 5126 kg/ha/year. In the second year (Table-248) the population size was static, 5001 numbers were harvested, 605 numbers were un-fished and 514 numbers were of mortality consideration. The average weight of fish was 413.8 g/year. The total yield from that pond was 1979.4 kg i.e. 5208 kg/ha/year.

In case of pond-5 (Table-249):

During first year, the total number of fish population was 6000. Among them 4812 numbers were caught, 468 numbers were un-fished and 708 numbers were of mortality consideration. The average growth of fish was 474.20 g/year. Total yield was 2292.52 kg/year i.e. 6033 kg/ha/year. In the second year (Table-249) the population number was static, 5262 numbers were caught, 597 numbers were un-fished and 641 numbers were of mortality consideration. Average growth 453 g/year. The total yield was 2335 kg/year i.e. 6147 kg/ha/year.

In case of pond-6 (Table-250):

The total number of fish population was 6000 number in the first year April'98-March'99, 4620 numbers were caught, 492 numbers were un-fished and 880 numbers were of mortality consideration. Average growth of fish was 459.8 g/year. The total yield was 2150.81 kg/year i.e. 5813 kg/ha/year. In the second year (Table-250) the population number was static, 4710 numbers of fish were caught, 979 numbers were un-fished and 577 numbers were of mortality consideration. The average body weight was 475 g/year. The total yield was 2174.49 kg/year. i.e. 5877 kg/ha/year.

In case of pond-7 (Table-251):

The total number of fish was 5200 numbers in the first year April'98-March'99, 4138 numbers were caught, 554 numbers were un-fished and 508 numbers were of considered as mortality. Average weight was 546.20 g/year. The total yield was 2281.40 kg/year i.e. 6710 kg/ha/year. In the second year (Table-251), the population was static, among them 4229 numbers were caught, 521 numbers were un-fished and 450 numbers were of mortality consideration. 546.60 g was the average growth of fish/year. Annual yield was 5730.52 kg/year i.e. 6630 kg/ha/year. From the over-all comparative fish production (Table-252) it observed that the maximum fish production was found in pond no. 7 in the first year was 6710 kg/ha and in second year it was 6630 kg/ha where feed sample 4 was applied. It may be noted that the high rate of production of fish in control pond (pond 7) was due to application of commercial costly feed (feed sample 4). In pond nos. 5, 6 where feed sample 3 containing slurry and mustard oil cake was applied. The fish production was comparatively higher. By considering feed cost and locally available feed ingredients, the performance of feed sample 3 seemed to be more cost-effective and more affordable.

4.0. DISCUSSION

4.1. Physical Variables of Water

4.1.1. Water Colour

According to Reid (1964) fresh water possesses two colour, one true colour and another apparent colour. True colour of water reflects the level of productivity and the kinds of various dissolved and suspended materials of both organic and inorganic origin. Some efficient limnologist and experienced fish culturist can easily comment on the productivity of a water body by visualizing its water colour without using any instrument or analyzing any variable. The water colour generally indicates the abundance of phytoplankton and in that respect all the ponds under present study could be designated as productive.

4.1.2. Rainfall

The rainfall plays an important role in regulating the biological parameters of a water-body (Carter 1968). Water bodies in Bangladesh are expected to be profoundly affected by the rainfall. In the present study during first year there was no rainfall in December'98 and the maximum rainfall i.e. 370 mm was in July'98 and in second year the minimum rainfall i.e. 5 mm in January, 2000 and maximum 380 mm in September'99 (Figs. 3, 4, Table 1 a). Miah *et al.* (1979) recorded the highest rainfall in the month of July and lowest in the month of March. The rainfall has a great effect on water level and ultimately influenced the physico-chemical factors of water. Similar observation had been made by Vaas (1955).

4.1.3. Sun-shine

Hours of sun-shine is a climatic factor of limnological importance because of its direct role in the photosynthesis by green plants. Production is determined by the hours of sun-shine in a particular geographical location. In the present study, during first year hours of sun-shine was minimum (4 hours) and maximum (8.9 hour) (Figs. 5, 6, Table 1 b).

4.1.4. Humidity

The usual phenomenon in the tropical countries is to play a vital role of monsoon in controlling the humidity as well as the rainfall. During the present work, the humidity was maximum i.e in the first year 83% in August'98 and in second year 85% in March, 2000 (Fig. 7, Table 1 c). During the study period fluctuation of humidity was observed, which is the characteristic of a tropical country. The average relative humidity was found to be directly related to the rainfall, which confirmed the findings of Islam *et al.* (1974).

4.1.5. Water Depth

Sun light is co-related with water depth. In shallow ponds sun light penetrates up to the bottom, warms up the water and facilitates increase in productivity though ponds shallower than 1m gets over heated in tropical summers inhibiting survival of fish and other organisms. According to Jhingran (1985), while depths greater than 5m are rare in fish ponds, Generally a depth of about 2m is considered congenial from the point of biological productivity of a pond. In the present investigation the maximum water depth varied from 186 cm to 194 cm and the minimum water depth varied from 155 cm to 161 cm. Similarly, in the second year the maximum water depth varied from 190 cm to 208 cm and minimum water depth varied from 155 cm to 172 cm (Figs. 8, 9, Table 1.d). Miah *et al.* (1979) recorded the highest water level in July and lowest levels in May. Dewan (1973) obtained similar findings.

The water level of all the ponds exhibited a direct correlation with rainfall. The highest water depth was obviously due to heavy rainfall. Sahai and Sinha (1969) also recorded the highest water depth in the month of heavy rainfall, where the source of water was the rainfall only. The decrease in water level of the present experiment was probably due to excessive loss of water by surface evaporation and leaching, which coincides with the finding of Michael (1969) and Khalaf and Mc Donald (1975). Several workers have attempted to correlate morpho-edaphic factors of water-body with fish production. While both area and mean depth have been considered, the latter has been shown to be the important factor having inverse relationship with fish production (Rawson 1953). All the investigated ponds under present study were found to have suitable average water depth for composite fish culture.

4.1.6. Water Transparency

The transparency of a water-body normally indicates its productivity. It is usually affected by several factors such as viewer, silting, microscopic organisms, suspended organic matters, latitude, season and the angle and intensity of sun light. (Reid, 1964). Transparency as recorded by secchi-disc expressed more or less a direct relationship with water depth in the presently observed ponds. This relationship confirms the findings of Rao (1955), Munwar (1970) and Naser *et al.* (1990). Transparency of water was also affected by the rainfall, which might have been due to the rain water in the fish pond causing the lower transparency and higher turbidity. Similar observations were made by Roy *et al.* (1966) and Vays and Kumar (1968).

In the present study, different feed samples were applied in different ponds, ultimately different readings of secchi-disc visibility were found. According to Rahman

(1992) a pond having secchi-disc visibility of 40 cm or less does not need fertilization, because fertilization in such pond may create hazardous to lethal situations for fish.

During the first year of the study, the maximum water transparency varied from 33.5 cm to 35.5 cm and minimum water tranparency varied from 28.6 cm to 30.6 cm Similarly, in the second year the maximum water transperancy varied from 32.9 cm to 39.6 cm and minimum water tranparency varied from 28.9 cm to 30.7 cm (Figs. 10, 11, Table 1 e). These support favourable condition in productivity in all the presently investigated ponds.

4.1.7. Temperature

The degree and annual variation in temperature of a water body have a great bearing upon its productivity in general. All organisms including fish possess well defined limits of temperature tolerance with the optimum lying somewhere in between. All metabolic and physiological activities and life processes such as feeding, reproduction, movement and distribution of aquatic organisms are greatly influenced by water temperature. (Macan 1961, 1963, Macan *et al.* 1966). According to Jhingran (1985) in the tropics the water temperature shows only a little seasonal variation in the area. In certain part of India, where winter and summers are severe in intensity, the range of water temperature in the plains is 20°C or more. During the first year of the study period the air tempareture varied from 22°C to 32.3°C and in second year it varied from 21.1°C to 33.4°C (Figs. 12, 13, Table 1 f). Similarly the water tempurature in the first year varied from 22.5°C to 33.4°C and in second year from 22.4°C to 33.5°C (Figs. 14, 15, Table 1 g). Similar observations were made by Islam *et al.* (1978) and Dewan (1973). Durve and Bal (1961) also reported highest temperature during April and May. During summer months the water temperature was higher than the air temperature. This might be due to rapid change of air temperature than that of water temperature. The highest and lowest values of water temperature might be due to bright sun shine and cloudy weather during the sampling time. It was observed that during the study period water temperatures of the ponds were closely related to air temperature. This is similar to the finding of Rice (1983), Roy (1955), Chowdhury and Mojumder (1981) and Nasir *et al.* (1990). They suggested that the temperature of shallow and small water body might follow air temperature closely with only small variation in amplitude and time. Welch (1952) stated that more the smaller body of water, the more quickly it responses to the changes in atmospheric temperature. According to Rahman (1992) temperature is closely related to the solar radiation and its penetration power into the water. Temperature varies with solar radiation, season, time of the day, geographical position, water depth, meteorological condition etc. Temperature of water was higher than air temperature in presently studied ponds, which in agreement with Roy (1983), Rahman (1983), Alam (1983) and Huq (1984). This might be due to rapid change of air temperature than that of the water temperature. Records of higher water temperature is similar to those obtained by Alam (1986). Khalaf and Mc Donald (1975) pointed out that the water temperature tended to exceed the air temperature remained higher than the surrounding air due to thermal properties of water and air. According to BAFRU (1990) in their survey to various fish farm of Bangladesh to study water quality, the mean pond water temperature was 27°C.

Fish display great variability in their tolerance to temperature. According to Das (1945) *Tilapia* can survive the temperature ranged from 8°C to 41°C. The grass carp, *Ctenopharyngodon* which belongs to the cold rivers of China is known to stand at the temperature up to 40°C. The Silver carp *(Hypopthalmichthys)* also a native fish of the cold rivers of China however shows sign of distress at 40°C. Both the species prefer temperature below 30°C. Indian major carps thrive well in the temperature range 18.3°-37.9°C. Temperature below 16.7°C and above 39.5°C prove fatal to them. The temperature of air breathing fishes like *Anabas, Channa* lies between 38°-42°C. By comparing with the cited information the temperature data in the present investigation was quite suitable for the selected variety of fishes to thrive well.

4.2. Chemical Variables of Water

4.2.a. Hydrogen-ion Concentration (p^H)

According to Karim (1975) fresh water is classified as acid, neutral or alkaline, depending upon the hydrogen-ion concentration. Theoritically, a P^H 7 is neutral and indicating equal concentration of hydrogen and hydroxyl in the water. When the P^H is above 7 the water is alkaline in reaction. When the P^H is below 7 the water is acidic in reaction. For fish culture the best water is neutral or a P^H slightly in the alkaline side. According to BAFRU (1990) the optimum P^H range for most fresh water species of fish is from P^H 6 to P^H 9. According to Jhingran (1985) the variation in the P^H of water are linked with the species composition and life process of fish. The P^H of pond water undergoes a diurnal change, it beeing most alkaline in mid afternoon and most acidic just before day-break. The fish gets prawn to attacks of parasites and diseases in acidic water. Water P^H in different ponds under present study showed different changes by the application of different feed samples.

During the present study by applying feed sample 1 in case of pond no. 1 during first year of the study period, the p^H value was minimum i.e. 6.5 in November'98 and maximum i.e. 7.2 in September'98. While in second year it was minimum i.e. 6.8 in December'99 and was maximum i.e. 7.9 in September'99 (Fig. 16, Table 14, 15). In the first year, the water was slightly alkaline, while in the second year it was slightly acidic. In case of pond-2 during first year the p^H value was minimum in January'99 and maximum in October'98. In the second year it was minimum in January,2000 and maximum in October'99.

In two years studied period by applying feed sample1 in pond nos. 1, 2 the p^H value was minimum i.e. 6.5 in November'98 and maximum i.e 7.9 in September'99 (Fig. 16, Table 1.h). By applying feed sample 2 in pond nos. 3, 4 it was minimum in October'98 i.e. 6.3 and maximum in March'99 i.e. 8.4 (Table 1.h). By applying feed sample 3 in pond nos. 5, 6 the p^H value was minimum i.e 6.3 in May'98 and maximum i.e. 7.4 in July'99 (Table 1.h). By applying feed sample 4 in pond no. 7 the p^H value was minimum i.e. 6.8 in October'99 and maximum i.e. 7.5 in July'98 (Table 1.h). Miah *et al.* (1979) recorded the highest values of p^H in April and lowest value in May. The lower value of p^H might be associated with the high rate of production of free carbon dioxide to rapid decomposition of organic matters compared to its rate of utilization during the photosynthesis. Roy *et al.* (1966) recorded similar findings.

According to Welch (1952) and Hutchinson (1957) the range of p^H of inland water is 6.0-9.0. Ellis (1937) had observed that p^H ranging from 6.7 to 8.4 is suitable for the growth of aquatic biota. Most water bodies have p^H within the range from 6.5 to 8.5 (Rahman 1992). The p^H value in alkaline condition in the water bodies was supposed to be helpful for proper growth and development of fishes (Nikolsky 1963). According to Swingle (1967) p^H ranging from 6.5 to 9.0 is suitable for pond fish culture and p^H more than 9.5 is unsuitable because free CO_2 is not available in this situation. Reid (1964) noted that when p^H is higher than 8.0, free CO_2 is usually absent. According to Reid p^H value was inversely related to the temperature and CO_2 content. Islam and Mendas (1976), Verma (1969), Jonasson (1972), Khalaf and Mc Donald (1975), Oppenheimer *et al.* (1978) and Begum *et al.* (1987) found the similar results where p^H showed direct relations with dissolved oxygen. Similar results also observed by Wetzel (1975), Ali *et al.* (1989), Khan *et al.*(1990) and Naser *et al.* (1990). BAFRU (1990) found in their survey in various fish farms of Bangladesh a mean p^H value of 7.5. During the present research work, while comparing the p^H data of all ponds it was observed that the water of different ponds was not too much acidic or alkaline. The p^H of pond nos.5, 6 was considerably better (Table-1.a.8) where feed sample 3 was applied.

4.2.b. Dissolved Oxygen (DO)

The pond water receives oxygen mainly through two sources- (i) by absorption from the atmosphere at the surface of the pond and (ii) by photosynthesis of the chlorophyll bearing organisms that inhabiting in the ponds (Jhingran 1985). Dissolved oxygen is a critical factor in intensive fish culture. Oxygen is a major component of air comprising 20.95% but is sparingly soluble in water. The main factors influencing the presence of oxygen in water (a) temperature (b) salinity (c) atmospheric pressure (BAFRU 1990). During day time plants in the process of photosynthesis, release oxygen while consuming CO_2. At night when photosynthesis ceases the plants consume oxygen and release CO_2 through respiration (Jhingran 1985).

By applying feed sample1 in pond nos. 1, 2 the minimum amount of DO was 6.5 mg/l in July'98 and maximum amount of DO was 8.5 mg/l in October'99 (Table 16 and 17). It may be noted that there was a destructive flooding through out Bangladesh in 1998. By applying feed sample 2 in pond nos. 3, 4 the minimum amount of DO was 6.5 mg/l in October'98 and maximum amount of DO was 12 mg/l in March'99 (Table 16 and 17). By applying feed sample 3 in pond nos. 5, 6 the minimum amount of DO was 6.9 mg/l in March'99 and maximum amount of DO was 8.9 mg/l in September'99 (Table 16 and 17). By applying feed sample 4, in pond no. 7 the minimum amount of DO was 7.7 mg/l in October'99 and maximum amount of DO was 9.2 mg/l in April'99 (Table 16 and 17). Oxygen content was higher in summer than in monsoon season (Chakraborty *et al.* 1959). Pahwa and Mehrota (1966) and Dewan (1973) observed minimum amount of oxygen during the month of monsoon. Roy (1955) and Swale (1964) also noted minimum dissolved oxygen during summer and maximum during winter. Miah *et al.* (1979) observed maximum amount of oxygen in April i.e. 9.05mg/l and minimum in July i.e. 5.25mg/l. The low amount of oxygen during monsoon might be associated with the warming of water, greater consumption of oxygen by inorganic matters and suspended substances and due to reduced photosynthetic activities of phytoplankton by the low exposure of sunlight during season.

In addition to taking part in many chemical and biological reactions, oxygen was consumed continuously in respiration by both plants and animals in the water and it was produced by plant photosynthesis only when sufficient light and nutrients were available in the water. Oxygen content of water was much less than that of air, and was inversely proportional to water temperature. Consequently, oxygen was easily depleted by respiration and decomposition. Unless continuously replenished from the air or by photosynthesis of aquatic plants, the short and long term variations in DO of lakes and ponds give a good measure of their tropic state (Goldman and Home 1983). Hutchinson (1957) aptly remarked that a series of oxygen determinations along with the turbidity and colour of the water could provide. DO consumption is almost double by a rise of 10^0 C temperature (Welch 1952, Ruttner 1975), Miller and Rabe (1969) also observed inverse correlation between oxygen and transparency. By comparing all the dissolved oxygen data in different ponds, it may be observed that the quantity of dissolved oxygen in pond water was within limit and in case of feed sample-3, the readings of dissolved oxygen of pond-5 and pond-6 were considerably better (Fig. 17, Table 1 j) which is in close agreement with those of Verma (1969), Dewan (1973). Swingle (1967) made a practical assessment on the dissolved oxygen requirements of warm water fish pond. According to him dissolved oxygen < 1 mg/l was lethal, fish could survive in 1-5 mg/l but can't reproduce and results in poor growth and in > 5 mg/l, fish reproduce and grow normally. Ellis (1937) reported that 5.0mg/l of DO, provides a favourable productive condition of water bodies. Banerjee (1967) considered 5.0 to 7mg/l of dissolved oxygen content of water to be average or good in respect of productivity and water having DO below 5.00 ppm to be unproductive.

4.2.c. Carbon dioxide (CO_2)

Carbon dioxide in natural waters is derived from various sources (i) the atmosphere (ii) respiration of animals and plants (iii) bacterial decomposition of organic matters (iv) inflowing ground waters which seep into ponds. The carbon dioxide content of the air is about 0.03% by volume and in rain water about 0.6mg/l (Jhingran 1985). The total Carbon dioxide i.e. bi-carbonate, carbonate and free carbon dioxide in most netural water is normally less than 5mg/l. It may be higher in ground water during die off phytoplankton blooms, during cloudy weather in heavily firtilized fish ponds, in intensively fed fish farm (BAFRU 1990). In the present study by applying feed sample 1 in pond nos. 1, 2 the minimum amount of CO_2 was 10.9 mg/l in April'99 and maximum amount of CO_2 was 12.5 mg/l in December'98 (Table 18 and 19). By applying feed sample 2 in pond nos. 3, 4 the minimum amount of CO_2 was zero mg/l in September'98 and maximum amount of CO_2 was 21.1 mg/l in November'98 (Table 18 and 19). By applying feed sample 3 in pond nos. 5, 6 the minimum amount of CO_2 was 10 mg/l in April'98 and maximum amount of CO_2 was 13 mg/l in September'98 (Table 18 and 19). By applying feed sample 4 in pond no. 7 the minimum amount of CO_2 was 7.6 mg/l in July'99 and maximum amount of CO_2 was 9.2 mg/l in January'99 (Table 18 and 19). The amount CO_2 during first year ranged from 5 to 13.2 mg/l and in second year it ranged from 5.3 to 12.7 mg/l in different ponds (Fig. 18, Table 1.i).

Miah *et al.* (1979) recorded the highest concentration CO_2 was in August and lowest concentration was in March. Miller and Rabe (1969) observed the similar results. The high amount of free CO_2 during monsoon could be due to release of CO_2 as a product of decomposition of organic matters and it is speeded up by the high temperature. The influence of cloudy weather reduced the rate of photosynthesis and increased the rate of free CO_2 liberation though respiration and decomposition of organic matters. The low level of free CO_2 during early summer was probably due to high rate of consumption in the process of photosynthesis in comparison with its rate of production through respiration and decomposition. Sahai and Singha (1969) also observed high levels of free CO_2 in June and lower levels of the same in January. Lakshminarayan (1965) and Dewan (1973) also observed higher amount of CO_2 during the monsoon.

Carbon dioxide was a minor component of air but was quite abundant in water because of its greater solubility in water than oxygen. The rate-limiting step in the solution of

CO_2 in water in the hydration reaction, which produces Carbonic acid (Goldman and Home 1993). This reaction may limit the photosynthetic rate for a short time during calm days in some productive water where free CO_2 is relatively low to plant demand. Free CO_2 is directly related with the amount and nature of biological activities in the water (Michale 1969). It is the most prevalent at P^H 6.5, it also affects the oxygen carrying capacity of fish blood and is particularly toxic when DO concentration is low. High concentration of CO_2 may be tolerated by fish if DO concentration are also high (BAFRU 1990). Carbon serves as a precursor element for primary production processes and was very much sought by the phytoplankton community. Carbon dioxide was not appreciably toxic to fish, most species will survive for several days in waters containing CO_2 up to 60 mg/l, provided dissolved oxygen is plentiful (Jhingran 1985). The present concentration of CO_2 as obtained in both years had no lethal effects on fishes indicating that the concentration of CO_2 were tolerable to fish.

4.2.d. Alkalinity:

The term Alkalinity was some what related with the concentration of carbonate, bicarbonate and hydroxide ions in the water are expressed as $CaCo_3$. In Alkaline water essential nutrients were found in higher quantities and this was the most important reason for the higher biological productivity in alkaline waters than in acidic waters. But the higher alkaline conduction was not favourable for biological production (Jhingran 1985). In fish culture total alkalinity is more important than total hardness. Total alkalinity generally may range from zero to several hundred ppm in natural water bodies (Rahman 1991). According to Alikunhi (1957) total alkalinity more than 100 ppm should be present for highly productive water body. Water bodies having total alkalinity 40 ppm or more are considered more productive than water bodies of lower alkalinity (Mairs 1966). According to Boyd (1982) total alkalinity should be more than 20 ppm in fertilized pond.

It was observed that in two years studied period by applying feed sample 1 in pond no. 1, 2 during first year the alkalinity ranged from 80 ppm to 91 ppm and in second year it ranged from 78 ppm to 97 ppm (Fig. nos. 19, 20 Table nos. 1(l), 20, 21). When feed sample 2 was applied in pond nos. 3, 4 it ranged from 50 ppm to 130 ppm and in second year it ranged from 70 ppm to 118 ppm (Fig. nos. 19, 20 Table nos. 1(l), 20, 21). Feed sample 3 was applied to pond nos. 5, 6 in the first year alkalinity ranged from 81 ppm to 91 ppm and in second year it ranged from 80 ppm to 91 ppm (Fig. nos. 19, 20 Table nos. 1(l), 20, 21). By applying feed sample 4 in pond no 7 the alkalinity ranged from 80 ppm to 94 ppm and in second year it ranged from 79 ppm to 85 ppm (Fig. nos. 19, 20 Table nos. 1(l), 20, 21). By comparing all the data of different ponds the amount of alkalinity was within limit for optimum fish production in ponds.

4.2.e. Hardness:

Hardness is the characteristic of water representing the total concentration of Calcium and Magnesium ions expressed as milligram per liter. When other ions are present in insignificant amount the hardness will be equal to or less than the sum of the carbonate and bicarbonate alkalinities and is termed as carbonate hardness. If the hardness exceed the sum of the alkalinities, the presence of other ions is indicated, and the excess is expressed as non carbonate hardness (Lind 1979).

By applying feed sample 1 in pond nos. 1, 2 during first year the hardness ranged from 95.9 mg/l to 111 mg/l and in second year it ranged from 103 mg/l to 135 mg/l (Fig. 21, Table nos. 1.k, 22, 23). When feed sample 2 was applied in pond nos. 3, 4 it ranged from 92 mg/l to 120 mg/l and in second year it ranged from 95 mg/l to 111.5 mg/l (Fig. 21, Table nos. 1.k, 22, 23). Feed sample 3 was applied to pond nos. 5, 6 in the first year, hardness ranged from 99 mg/l to 111 mg/l and in second year it ranged from 100 mg/l to 117 mg/l (Fig. 21, Table nos. 1.k, 22, 23). By applying feed sample 4 in pond no 7 the hardness ranged from 96.7 mg/l to 102 mg/l and in second year it ranged from 99 mg/l to 106 mg/l (Fig. 21, Table nos. 1.k, 22, 23). According to the classification of hardness the presence of metalic ion i.e 0-60 mg/l = soft water, 61-120 mg/l. = hard water, 121-180 mg/l. = moderately hard water and above 181 mg/l = very hard water (Brown *et al.* 1970). Miah *et al.* (1979) found the highest value of the total hardness was in April and lowest was in August. The highest value was due to adequate amount of dissolved oxygen in water. Lakshminarayan (1965) observed high value of hardness in winter and low value during rainy season. The low value of total hardness was probably due to excessive dilution by rain water. Allenson (1961), Islam *et al.* (1974) made similar observation. Fresh water fish culture are normally require a total hardness greater than 20 mg/l (BAFRU 1990).

All the data of different ponds during present study were in the category of slightly hard water which was in culturable limit.

4.3. PHYTOPLANKTON

In the present investigation, the results obtained after the analysis of plankton samples were described for each pond separately. However, all the algal genera recorded for the ponds mainly belonged to four Classes. The qualitative and quantative studies which had been done by microscopic observation and counting are presented here. According to the order of dominance in abundance by number, these had been ranked in the following order; Chlorophyceae > Cyanophyceae > Bacillariophyceae > Euglenphyceae.

In the present study quantitative estimation for different groups of phytoplankton were made by applying feed sample 1 in pond no. 1 in first year the phytoplankton density ranged between 17301-40503 individuals/l. In the second year of study period the population ranged from 14044-32530 individuals/l. In both the years there were two peaks of population in their seasonal abundance. In first year it was in June'98 and July'98, in second year it was in June'99 and July'99 (Table 1. m). Banu *et al.* (1987) estimated phytoplankton density to be 4093-352809 individuals/l in some fish ponds in the north-western region of Bangladesh. The data of the present study was within the range reported by Banu *et al.* (1987). By applying feed sample 2 in pond 3 in the first year of research period the phytoplankton ranged from 26100-73745 individuals/l. Here the highest abundance was in July'98 i.e. 73745 individuals/l and in the second year it was maximum in July'99 i.e. 67830 individuals/l (Table 1.a.13). In the study of Begum and Alam (1987) higher density of phytoplankton ranged from 11-15.5 x 10^5 individuals/l/year. When the lower end of the data was converted to individuals/l/month, it gave a figure more than 90000 individuals/l. This is still higher than what was obtained in the present study. By applying feed sample 3 in pond no. 5, 6 the maximum abundance was in July'98 i.e. 70380 individuals/l. In the first year and 68210 individuals/l in July'99 in second year (Table 1.m). This was similar to the findings of Miah *et al.* (1981). By applying feed sample 4 the population abundance ranged from 21181-66018 individuals/l in the first year and 25806-64337 individuals/l in the second year (Table 1.m). This is in agreement with the findings of Mathew (1985). There were veriation in the average number of group individuals of phytoplankton (Table 1.n). In the present study phytoplankton density increased sharply through June to July in both the year probably due to cloudy weather. Similar results were also observed by Khan (1974) and Ali and Islam (1981). Miah *et al.* (1979) recorded maximum phytoplankton population in June. Islam *et al.* (1975) recorded the similar results. Krishnamurthy and Visvesvara (1966) recorded peak population of phytoplankton during summer months. The high density of phytoplankton population might be due to the amount of phosphate content and organic matters in water. The plankton population showed more or less direct relationship with temperature, rainfall, free CO_2 and more or less inverse relationship with dissolved oxygen and total hardness. Roy (1955) and Chakraborty *et al.* (1959) reported a strong relationship between physico-chemical variables and plankton population of pond water. They stated that peak occurence of phytoplankton population during summer months was associated mainly with the maximum sunshine and warmth of the season. These finding are in confirmity with the finding of the present study. In the present study phytoplankton population showed more or less positive correlation with average growth of different fish species (Table 308).

The phytoplankton abundance in the study period was about 1.5-3 times more than that of zooplankton. A similar ratio between phytoplankton and zooplankton abundance was also observed by Ameen *et al.* (1986). A higher abundance of phytoplankton over the zooplankton in a water body could simply be attributed to the upper position of zooplankton in the food chain. In fact, many authors stated that the abundance of phytoplankton was always higher than the zooplankton (Rahman *et al.* 1982 and Mostofa 1984).

In general there was a direct relationship between phytoplankton and zooplankton (Table 297) i.e. when number of phytoplankton increased the zooplankton numbers increased. Similar relationship was also obtained by Chakraborty *et al.* (1959) and Prasad (1969). However, in variance with the present study an inverse relationship was reported by Moitra and Battyacharia (1965), Miah *et al.* (1981) and Islam and Saha (1975). Das and Sreeevastava (1956-a) and Islam and Saha (1975) also observed inverse relationship between zooplankton and phytoplankton. In the present study, phytoplankton population contributed about 50-70 % to the overall abundance of plankton. Begum and Alam (1987) found that phytoplankton formed about 75 % of the planktonic community. Chlorophyceae was the most dominant group of phytoplankton and formed about almost 50 % of the total plankton community. By applying feed sample-1 in pond nos. 1, 2 in both the years, Chlorophyceae was the most dominant group (Figs. 23, 24, 36). Similar result was obtained in case of pond nos. 3, 4, 5, 6 and 7. By applying feed sample-4 in pond no. 7 the abundance of Cyanophyceae was significantly higher in both the years (Fig. 37). Almost similar abundance of Chlorophyceae was also noted by Sultana (1997). Zaman *et al.* (1993,1994) found that the abundance of Chlorophyceae varied from 31-92 % of the total plankton community. In different ponds a wide range of seasonal fluctuation of Chlorophyceae, Cyanophyceae, Bacillariophyceae, Euglenophyceae were ovserved (Figs. 34, 35, 36). Anonyomous (1983) found that diatomaceae was the dominant group of phytoplankton in a mini pond. Which does not agree with the data found by applying feed sample 4 in pond no. 7 of the present work. During the present investigation the data of pond nos. 5, 6 by applying feed sample 3 was considerably better by comparing with the data found by application of other feed samples in other ponds.

4.4. Zooplankton

In the present study, zooplankton comprised about 35-40 % of the plankton community in the pond. This figure is less than what was reported by Begum *et al.* (1992). In the latter study zooplankton contributed more than 50 % to the total plankton abundance. However, a much more lower abundance of zooplankton compared to phytoplankton abundance was reported by Sultana (1997).

The major groups of zooplankton observed in the study ponds were Rotifers, Copepods, Cladocerans, Protozoans, Nauplius larvae and other miscellaneous groups. Several workers have confirmed the presence of the above groups of zooplankton in pond environment (Habib *et al.* 1984, Patra and Azadi 1987, Begum *et al.* 1982, Chowdhury *et al.* 1989, 1992). However, Sultana (1997) and Hassan (1992) reported fewer groups of zooplankton from Curzon Hall pond and Dhanmondi Lake, Dhaka respectively. In the present investigation by applying feed sample 1 in pond nos. 1, 2 in two years the minimum abundance of zooplankton was 7189 individuals/l in August'98 and maximum abundance was 11908 individuals/l in June'98 (Table 1. o). By applying feed sample 2 in pond nos. 3, 4 in both the year the minimum abundance of zooplankton was 9804 individuals/l in August'99 and maximum abundance was 24323 individuals/l in June'98 (Table 1. o). By applying feed sample 3 in pond nos. 5, 6 in both the year minimum abundance of zooplankton was 8110 individuals/l in September'98 and maximum abundance was 21856 individuals/l in May'98 (Table 1. o). By applying feed sample 4 in pond no. 7 the minimum abundance of zooplankton was 2928 individuals/l in August'98 and maximum abundance was 9008 individuals/l in April'99 (Table 1. o). The average number of zooplankton varied in a wide range of fluctuation during the present work (Table 1.p). In the present study by applying four feed samples in different ponds the minimum abundance of zooplankton was 2928 individuals/l in August'98, in case of feed sample 4 in pond no. 7 and the maximum abundance was 24323 individuals/l in June'98, in case of feed sample 2 in pond no. 3 (Table 1. o).

Habib *et al.* (1984) reported a highest abundance of zooplankton as 19717 individuals/l from a fish pond in Mymensingh and hence compared favourably with the results of the present study. On the other hand an extremely low abundance of zooplankton i.e. 375-2800 individuals/l had been reported by Sultana (1997) from a pond in Dhaka city. However, the ponds under present work didnot receive any fertilizer for enhancement of plankton production. Further Sultana observed that the low abundance of zooplankton probably occurred due to the sampling regime. Hasan (1994) also reported low abundance of zooplankton i.e. 225-1575 individuals/l from Dhanmondi Lake, Dhaka. Again this particular lake was unmanaged and no production enhancement activity was practiced.

However, surprisingly a much more higher abundance of zooplankton i.e. 1,29,133 individuals/l was observed by Chowdhury *et al.* (1992) in a semi-intensive fish pond in Dhaka. Information on pond treatment and stocking density of fish in the pond was not known. In the ponds under the present study moderate number of Carps was stocked and that the grazing effects by the Carps might have reduced the zooplankton abundance in the pond to some extent. In different ponds a group wise distribution of zooplankton were ovserved. There was a wide range of population fluctuation among those groups (Figs. 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64). The zooplanktonic population in the present studied ponds showed monthly fluctuations in their abundance (Figs. 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63).By applying feed sample 1 in pond no. 1 in first year of present research some successive population peaks were noted i.e. 13101 individuals/l in November'98, 12705 individuals/l in January'99 and 12311 Individuals/l in August'98. From the data (Table 66 and 67) monthly fluctuation of the zooplanktonic abundance was the highest, observed firstly in August'98 than November'98 and than in January'99 (Figs. 39, 43). Similarly in the second year there were some successive peaks, i.e. 10780 individuals/l in May'99, 10311 individuals/l in June'99, 10133 individuals/l in August'99 and 10118 individuals/l in November'99 (Figs. 40, 44).

Earlier researchers also noted monthly fluctuations in population abundance of zooplankton in various habitats (Habib *et al.* 1984, Begum *et al.* 1982, Chowdhury *et al.* 1987, 1989, 1982, Hasan 1994, Sultana 997, Patra and Azadi, 1987, Ali *et al.* 1984, 1989, Mollah *et al.* 1978, Michael 1968, Mathias 1991, Bhuiyan 1974, and Miah *et al.* 1983). The variation in the zooplankton population abundance could result from the variations in nutrients, water chemistry and other factors including geographical position, altitude and many more (Welch 1952). In the study period the population abundance of zooplankton in the first year ranged from 8,110 to 24323 individuals/l where as in the second year it ranged from 7189 to 23908 individuals/l in different ponds (Table 277).

Habib *et al.* (1984) found in their study, the monthly variation of zooplanktonic abundance ranged from 1498-19717 individuals/l. In the present case different feed samples were supplied to different ponds at regular intervals through out the year and therefore the nutrient level in the water probably remained nearly static and that probably eliminated nutrient dependent variation in the zooplankton production. Extreme variation in the seasonal abundance of zooplankton was probably observed in unmanaged natural water bodies when dynamics in nutrient levels influences the pond production. Excepting Protozoa and miscellaneous group, a total of 20 genera of zooplanktons were identified from different ponds during the present study. Habib *et al.* (1984) recorded 17 genera of zooplanktons from a fish pond. Hassan recorded 33 genera of zooplanktons from an artificial lake in Dhaka City. Kabir *et al.* (1997) reported 31 genera of zooplanktons from flood plain in Noakhali. In the present ivestigation the maximum abundance of zookplanktons i.e. highest peak was in June of the year, in some cases it was in May and August of the year (Table 278).

In conformity with the present findings, George (1964) observed peak production of zooplankton in June. He also noted zooplankton abundance during winter months. Krishnamoorthi and Visvesvara (1966) recorded maximum zooplankton population in February-April, and also during December-January. However, Miah *et al.* (1983) observed a single peak in zooplankton production in November. Habib *et al.* (1984) also noted peak production in November. Begum *et al.* (1992) observed a peak production in April. However Patra and Azadi, (1987) reported a winter peak in zooplankton in Halda river. The observed peak production of zooplanktonic community in different ponds in the present study could be related to less rainfall in June and probably other pond conditions were also favourable. It may be worthy to mention that phytoplankton production was also higher during those periods. A further group-wise discussion on zooplankton is offered below;

Rotifera

In the present study Rotifera varied in number by applying different feed samples in different ponds, the population abandance in the first year ranged from 733 to 8809 individuals/l and in second year it ranged from 1196 to 9117 idividual/l in different ponds (Figs. 66, 67).

In the study of Habib *et al.* (1994) the Rotifera population fluctuated from 1530 (4.19%) to 15488 (42.37%) individuals/l in November in a fish pond. Begum *et al.* (1992) observed higher Rotifera abundance (1,82,000 individuals/l) in a semi-intensively managed fish pond in April and accounted for about 52% of the zooplankton population which was much higher than that was reported in the present study. Unlike the present study Hasan *et al.* (1992) observed a peak abundance in the winter. In the present study 11 genera of Rotifera were recorded (Figs 69, 80) and all of them were reported from Bangladesh by various workers notably by Das and Bhuyan (1974), Islam and Saha (1975), Ali (1992). Almost the same number of genera was also reported by Habib *et al.* (1984) from a pond in Mymensingh. *Brachionus (Plate.44, Figs. 81, 82), Keratella (Plate. 45), Filina (Plate. 46, Figs. 67, 68)* were the most dominent genera in Rotifera population. Similar observations were also made by Habib *et al.* (1992), Begum *et al.* (1992). Arora (1966) stated that *Brachionus* was the most common and abundant genus through out the year. Perennial distribution of *Brachionus* is also supported by Ali (1992).

Cladocera

In the present investigation by applying different feed sample in different ponds the Cladoceran abundance in the first year ranged from 965 to 6108 individuals/l and in second year it ranged from 721 to 5633 individuals/l in different pond (Fig. 83, Table nos. 280, 281).

In the present study 5 genera of Cladocera were recorded (Figs. 84-91). Hasan (1994) recorded 8 genera of Cladocera from an artificial lake in Dhaka city. Among the different genera of the Cladocera in the present study, *Daphnia* was the most dominant genera. It was observed that in case of pond no. 1 in the first year the peak abundance was in January'99 (about 27.7% population of Cladocera). Similarly, in the second year the peak abundance was in February, 2000 i.e. about 19.25 % population was of Cladocera (Table 281). Simultaneously in different ponds, the Cladocera peak abundance was observed mainly in June, July and December of the year. Hasan *et al.* (1994) observed peak abundance in January. Habib *et al.* (1984) also noted Cladocera to be the second dominant group of zooplanktons. Chowdhury (1989) observed a Cladoceran peak in September and in their study Cladocera accounted only 4.36 % of the population. The higher production of Cladocera in the present study could be attributed to the application of organic manure, which was known to enhance the Cladoceran production (Anonymus 1986).

Copepoda

In the present study Copepoda emerged as the second dominant genera and having 2 genus (Figs. 100-103). During the first year, the population ranged from 384 to 6517 individuals/l and in second year it ranged from 819 to 6910 individuals/l in different ponds (Table 282, Figs. 98-99). Kabir *et al.* (1997) reported 4 genera of Copepoda in his study. Habib *et al.* (1984) reported 2 genera of Copepoda in his study. Hasan *et al.* (1994) also found Copepoda to be the second dominant group, Habib *et al.* (1984) found fluctuation of the Copepoda population between 265 and 1888 individuals/l, Chowdhury *et al.* (1992) noted a peak abundance (4667 individuals/l) in January. Das and Srivastava (1956) observed the peak of Copepoda abundance in September-November.

Ostracoda

Ostracoda emerged as a prominent group of zooplankton. In the present study it included only 2 genera. During first year the population ranged from 536 to 2837 induviduals/l and in second year it ranged from 318 to 3733 individuals/l in different ponds (Table 283, Figs. 92, 93). The abundance of Ostracoda was in January and December and the population varied from 11-19 % of the total zooplanktonic community. Hassan (1994) found 4 genera of Ostracoda. Habib *et al.* (1984) recorded only one genera of Ostracoda. Among these two genera, *Cypris* was more abundant in the present finding and with a wide range of monthly fluctuation than *Heterocypris* (Figs. 94-97).

From the above study it found that the abundance of Ostracoda was in January and December and the population ratio varied from 11-19 % of the total zooplanktonic community. However, in the study of Chowdhury *et al.* (1992) the population numbers varied from 3500 individuals/l (in February) to 50300 individuals/l (in April) that accounted for about 12% of the total zooplanktons. In contrast, Habib *et al.* (1992) and Hassan *et al.* (1994) observed no Ostracoda in a fish pond in Mymensingh and in Dhanmondi Lake, Dhaka, respectively.

Nauplius

In the present study, during the first year it ranged from 112 to 2872 individuals/l and in second year it ranged from 538 to 4200 individuals/l in different ponds (Fig. 104, Table 284)

The peak abundance of Nauplius was in January, September, June, July representing 11-24 % of the total zooplanktonic community. Similar observations were also made by Begum *et al.* (1992), Chowdhery *et al.* (1989). Unfortunately, No nauplii was observed by Habib *et al.* (1992) and Hassan *et al.* (1994). Nauplius was the first larval stage of Crustacea. Therefore, the pond having micro-crustacean population as Nauplius larvae.

Protozoan

In the study period, during first year it ranged from 730 to 8000 individuals/l and in second year it ranged from 770 to 8341 individuals/l in different pond (Table 285)

The highest peak abundance was in May and June representing about 23-39 % of the total zooplanktonic community. Begum *et al.* (1992), Chowdhery *et al.* (1989) also observed abundance of Protozoa in pond which contributed about 16 % to the total zooplankton of the ponds. Habib *et al.* (1992) observed very negligible number of Protozoa. Similar observation was also made by Ali *et al.* (1989) and Hassan *et al.* (1992) in a pond in Dhaka city and Dhanmondi Lake. Therefore, the population abundance of different genera of different groups of zooplanktons in the present study were in productive limit for fish culture.

4.5. Macro Benthos

The benthos is mainly responsible for the regeneration of inorganic nutreints, notably nitrogen and phosphorus which have been absorbed by the planktonic comunity and eventually settle to the bottom as detritus, it is therefore important in maintaining the productivity of fish ponds (BAFRU 1990). During first year the population abundance of macrobenthos ranges from 1813 to 7970 individuals/m^2 and in second year it ranged from 1804 to 9008 individuals/m^2 in different ponds (Table 286). The dominance of these groups of macro-invertebrate has been reported earlier by Srivastava (1959), Michale (1968) and Juday (1942) and Puke (1949) and in our country by Dewan (1973), Ali *et al.* (1978), Das *et al.* (1981), Anonymous 1980, 1992. Ali *et al.* (1981) recorded a great variety of genera from three ponds in Dhaka city. Das *et al.* (1981) recorded Hirudinea from an artificial pond at Bangladesh Agricultural University campus. A similar dominancy of these groups of benthos has also been noted (Michael 1968) in other works.

Ali *et al.* (1978) recorded that the number of benthos in pond in the Dhaka City varied from 325-17208 individuals/m^2. Ali *et al.* (1981) similarly found that benthic population of a rural fish pond fluctuated between 6842-15664 individuals/m^2. Anonymous (1980) recorded much higher abundance of benthos in a fish pond. On the other hand, the highest number 4079 individuals/m^2 of benthos was recorded from an artificial pond in Mymensingh (Anonymous 1980). It was therefore evident from the above that the abundance of benthos was highly variable and the present data were within the range reported by the above authors. The pond in present study appeared to be rich in the macrobenthic fauna. Considering their abundance these may be ranked as productive. According to Thinmann (1925) a bed producing over 2000 individuals/m^2 were considering highly productive. The abundance of benthos mainly depends on the nature and type of bottom sediment, availability of submerged aquatic vegetation and decaying organic debris, other ecological factors and the grazing pressure on them by other animals (Moore 1939, Rawson 1952, Welch 1952). The abundance of pond vegetation at shallow depth and use of slurry probably favoured the growth of benthic community. The average population number of different benthic group was mentioned in Table 1.a.17. During the present investigation by applying different feed samples in different ponds the peak abundance of macrobenthic fauna was in April, February and December in both the years of study (Table 287).

Patnaik (1971) reported the highest abundance of benthic population was in between October and December and minimum during monsoon period. However, Mondal and Moitra (1975) recorded the higher abundance of macrobenthos during summer months. Ali *et al.* (1981) also observed a peak abundance in January in a fish pond in Noakhali district.

However, Ali *et al.* (1978) recorded the highest population abundance of benthos in August in some ponds of Dhaka City. Anonymous (1980) also recorded the benthic population density was 23507 individuals/m^2 from a fish pond in Dhaka district. The occurrence of higher abundance of benthos in the studied ponds could be due to less water depth allowing light to penetrate to the bottom and thus availability of food organisms and materials at the pond bottom. It was evident from the results that the density of benthos was higher in shallow water than that in deep water. Karim (1969) made similar observation. Das *et al.* (1981), Miah *et al.* (1983) and Anonymous (1992), Jonasson (1961) noted that during decrease of water level the light penetration increased and hence the rate of decomposition increased. It was probable that shallow marginal zone of the pond received rich supply of nutrients and at this time oxygen and other physico-chemical factors remained favourable for the growth of the macrobenthos. A group-wise discussion of macrobenthos was offered below:

Oligochaeta

Oligocheatea were found to be the most dominant group of benthos during the present study. Eight genera of Oligochaeta were recorded and all of them are reported from Bangladesh by various workers. Rahman (1983), Roy (1983), Mustafa (1984), Sharker (1984), Das *et al.* (1981) recorded 6 species of Oligochaeta in an artificial pond. During first year of present study the Oligochaeta population varied from 46.14 % to 71.78 % and in second year it varied from 51.79 % to 68.25 % of the total benthic community (Table 288) and this agreed with the findings of Gupta (1976). The latter reported that Oligochaeta were found in greater number in decaying organic matter. Michael (1968) also reported that the alkaline nature of water had favoured the greater occurrence of the Oligochaetes. Ali *et al.* (1978) recorded as many as 4577 individuals/m^2 (February) Oligochaetes from fish pond. A much higher abundance (9548 individuals/m^2) in May was observed by Anonymous (1980-b). It was observed that, among the different genera of Oligochaetes, *Limnodrilus, Branchiodrilus, Branchiura, Dero* were more abundant in number (Figs. 107-119). The abundance of *Limnodrilus* during the first year ranged from 438-2984 individuals/m^2 and in second year it ranged from 431-1037 individuals/m^2 in different pond (Table 289) which confirmed the findings of Karim (1969), The presence of Oligochaetes in greater number in the ponds signified the presence of decaying organic matter.

Chironomids

The most abundant group of benthos was Chironomids. During the present investigation 5 genera of Chironomids were recorded. Das *et al.* (1981) recorded 6 genera of Chironomid in an artificial pond. In the present study, during first year it ranged from 517-3618 individuals/m^2 and in second year it ranged from 533-4713 individuals/m^2 in different ponds. The population peaks were in April and July of the year (Table 291). There was a wide range of fluctuation of population abundance among the different genera of Chronomid group (Figs. 120-124).

Many workers have reported the dominance of Chironomids in the pond environment (Mondal and Moitra 1975, Ali *et al.* 1978, 1981, Das *et al.* 1981). Ali *et al.* (1978) recorded as many as 15823 individuals/m^2 Chironomid from ponds in Dhaka city in August, Ali *et al.* (1981) reported about 5432 individuals/m^2 Chironomids from a village pond in Noakhali district. In confirmity with the present study, Mondal and Moitra (1975) found the highest peak of Chironomids in May. Most of the Chironomids genera were observed in shallow zone. In the present investigation the dominant genera were *Chironomus, Pentaneura, Tanypus* etc. Ali *et al.* (1978 and 1981) also found the higher abundance of Chironomid at shallow region of the pond.

Mollusca

During the present investigation 4 genera of Mollusca were identified, where Sitaramiah (1966) reported 6 genera of Mollusca in an artificial pond at Cuttak, India. In the present study, during first year Mollusca ranged from 111-1603 individuals/m^2 and in second year it ranged from 127-2507 individuals/m^2 in different ponds (Table 292). The peaks were in March, June, November of the year (Table 293).

In agreement with the present result, Ali *et al.* (1978) estimated a density of 1533 individuals/m^2 Mollusca in a pond in Dhaka city. Gupta (1976) found 2130 individuals/m^2 in his study in a artificial pond at Puna, India. Many workers recorded Mollusca to be the third dominant group of benthos in the pond of Bangladesh (Ali *et al.* 1978, 1981, Das *et al.* 1981, Anonymus 1992). This was in agreement with the present study. Ali *et al.* (1978) estimated the peak abundance in September in a pond in Dhaka City. However Gupta (1976) found Mollusca to be the most dominant group of macro benthos in Loni reservoir with the highest peak in July. In the present findings, there was a wide range of fluctuation in population abundance within the different genera of Mollusca (Figs. 125-132). Among the 4 genera, *Indoplanorbis, Viviparous* were the most dominant genus. Das *et al.* (1981) reported seven species from an artificial fish pond at the Bangladesh Agricultural University campus and *Viviparous* was the most dominant species. Ali *et al.* (1978) also reported *Viviparous* as a dominant species in a fish pond in Dhaka city.

Others

The miscellaneous non-abundant benthic organisms were represented in different ponds by nymphs of Odonata and Ephemeroptera, pupae of Culex, Ceratopogonoids etc. During the first year it ranged from 3.12 % to 6.99 % and in second year it ranged from 2.75 % to 6.5 % of the total benthic community in different ponds (Table 294). The abundance of these groups of benthos had also been noted by other workers (Ali *et al.* 1978, Das *et al.* 1981, Habib, 1984, Latifa *et al.* 1997). Therefore the population abundance of different genera of different groups of benthos was in productive limit in the present investigation.

4.6. Plankton Bio-mass

In the present study the estimation of plankton bio-mass was based on the measurement of weight after filtration of sample water. It was probable that suspended solids particles other than phyto and zooplankton might have contributed to the measured weight and thus may lead to the over estimation of the planktonic bio-mass. Nonetheless, these estimation may still serve as a good indicator of pond productivity and could be used for comparing the productivity of water bodies of similar characteristics (Kotani and Odate 1991). The bio-mass estimation based on weight measurement have been employed by many workers (Kalimurty 1975, Kravolsov *et al.* 1984, Anonymous 1984, 1986, 1995). During the study in the case of pond-1 in first year, the wet weight of plankton ranged from 18.30-24.51 mg/l (Table 295) where as in that period the dry weight of plankton ranged from 2.55-4.75 mg/l (Table 296). Similarly in the second year the wet weight of plankton ranged from 16.59-21.57 mg/l (Table 295) and dry weight ranged from 2.87-4.18 mg/l (Table 296). This estimation was higher than that of the report of Anonymous (1995).

Difference of this magnitude was not clearly understood. However, one of the reason for this difference could be the use of organic manure in the present studied pond that enhanced the plankton productivity. Bio-mass estimation from natural water bodies have been reported by different workers. Anonymous (1986) measured the plankton bio-mass from Bay in Japan. Similarly, Kravlsov *et al.* (1984) measured plankton biomass from an unfertilized ponds in USSR. The low values obtained in the above studies should not conflict with the present study because in the above two studies the authors measured the phytoplankton biomass only those concerned water bodies where no treatment was done for enhancement of plankton production. In the present work the peak abundance of phytoplankton, zooplankton and bio-mass was in May, June and July in both years (Table 297). In general, the bio-mass peak coincided with the peak in plankton abundance except in July. A close scrutiny of the present result reveals that although phytoplankton peak was observed in July but zooplankton peak was observed in June and this indicated that probably the zooplankton bio-mass contributed more to the total planktonic bio-mass.

4.7. Proximate Composition of Feed Samples

The manure supplies especially active anaerobic bacteria which in the presence of nitrogen cause rapid and effective humification results reducing the percentage of carbon and increasing the nitrogen. Bio-gas plant slurry are in vague for fertilizing fish ponds in Germany (Wunder 1949 and Probst 1931), Java (Lc Mare 1948), Belgian Congo (De Bont, 1950) and many other countries.

For the bio-chemical analysis of the feed ingredients, all the samples were taken in commercially dry form. Protein contains nitrogen as well as carbon, hydrogen and oxygen. The body cannot make from carbohydrate, fat, because they contain no nitrogen (King and Burgess 1992). Nitrogen is an essential constituent of protein that remain in all living cell of plant and animal. Each molecule of chlorophyll contains four atoms of nitrogen (Anonymous 1975). Sin *et al.* (1978) found that the growth of common carp was optimum at 32 % protein level. During present work protein level in case of feed sample 1 (Table 260) was 18.15 mg/100g and in feed sample 2 (Table 260) was 19.15 mg/100g, in sample 3 (Table 260) was 28.12 mg/100g, and in sample 4 was 29.73 mg/100g. Many studies recognized that high protein feed results in higher growth. Hepher (1988), Singh *et al.* (1992) observed that increase in the dietary protein level was associated with a significant increase in the absorption efficiency. Mazid *et al.* (1987) found that a level of 31.84 % protein in the diet was optimum for the growth of *Labeo rohita*. The fingerlings of *Catla catla* showed the highest growth with diet containing 30 % protein level (Akter *et al.* 1992). According to Mazid *et al.* (1992) 32 % protein level should be maintained in the diet of *Cirrhinus mrigala*. In the research findings Singh *et al.* (1978) found better growth performance of the exhibited feed than that of the control feed. The exhibited feed was made from mustard oil cake.

Different Researchers used animal protein in different fish meals but in the present work the major source of protein was plant resource i.e. mustard oil cake. Liener and Kakade (1980) in their research finding mentioned that fish growth might be hindered due to presence of some anti-nutrition factors in plant source of protein, but Hossain and Jauncy (1990) in their research finding conclude that the growth inhibitor as anti-nutritional factor have no significant effect upon fish growth. In the present finding the control feed had 4.80 mg/100g crude fibre where as in feed sample no. 3 (Table 258), the amount of crude fibre was 5.40 mg/100g. The amount of crude fiber in feed sample nos. 3, 4 was more or less close. The feed sample no. 4 was made from animal protein and other nutritional ingredients, but feed sample-3 was exclusively made from slurry and mustard oil cake. According to Begum *et al.* (1987) the amount of crude fibre was inversely proportional to protein. According to Boyd (1968) crude fibre helps to increase cellulose, hemi-cellulose, pectin etc. The presence of higher level of crude fibre may cause the poor growth of fish. Jauncey and Ross (1982) suggested that the crude fibre level of 8-12 % was optimum for good growth of fish. Higher amount of crude fibre level in dietary elements after metabolism could decrease the uptake of nutrients (Leary and Lovell 1975). Elements were referred to collectively as ash, because these were the proteins left after the organic or combustible matter was burned (Briggs and Calloway 1979). The ash amount in feed sample 1 (Table 256) was 15.30 mg/100g, in feed sample-2 (Table 256) was 18.09 mg/100g, in feed sample 3 (Table 256) was 11.04 mg/100g and in feed sample-4 was 17.54 mg/100g. It was observed that the presence of ash amount was higher in purchased feed (control) but lower in feed sample 3. Liener (1975) reported the presence of ash amount more than 20 % is not good nutritional feed. He found 16.57 % ash in his research finding, where he used soybean powder in the fish diet instead of animal protein. Fat was the essential component of cell membrane, source of metabolic energy for maintenance, reproduction and other embryonic development (Patton *et al.* 1941). Fat serves as efficient source of energy and insulating materials. Dietary fat helps in the absorption of fat soluble vitamins. Lipoprotein was the important cellular constituents (ITO 1972). During the present findings in case of feed sample-1 (Table 262) the amount of fat was 5.87 mg/100g, in feed sample-2 (Table 262) the amount of fat content was 7.84 mg/100g, in feed sample-3 (Table 262) it was 9.30 mg/100g and in feed sample 4 it was 8.45 mg/100g. The fat contents of control feed was lesser than the feed sample-3. Rathore and Kumar (1993) found 7.20 mg/100g fat contents in Chlorella which was used as feed of herbivorous fish in India. Carbohydrate was a class of substance, which included glucose, cane sugar, milk sugar, starch etc. Grain food was largely composed of starch and food stuff like cane sugar, glucose and pure carbohydrate. They form the main source of energy to the body (Gopalon *et al.* 1978). Carbohydrate was digested in the gut. It breaks down into glucose, which was absorbed into the blood and goes to the cells to provide energy.

During the present research work the amount of Carbohydrate in case of feed sample 1 (Table 264) was 42.77 mg/100g, in feed sample 2 (Table 264) was 47.44 mg/100g, in sample 3 (Table 264) was 51.32 mg/100g and in feed sample 4 was 68.16 mg/100g. Sen *et al.* (1978) observed that the growth of common carp was optimum at 28 % Carbohydrate level. Diepru *et al.* (1967) recommended 20% Carbohydrate as the most efficient level for channel cat fish.

Clement *et al.* (1967) in France reported that the dried alga Spirulina contained about 16-18 % of Carbohydrate. Soeder (1980) also obtained the amount of Carbohydrate as 21.40% in dry weight basis in Chlorella. Mazid *et al.* (1987) found that a level of 55.16 % of Carbohydrate in fish feed for better growth of *Labeo rohita*. In the present finding the amount of Carbohydrate in feed sample-3 (Table 264) was similar to the finding of Mazid *et al.* (1987). In India Gopalakrishnan and Srinath (1962) used sludge as pond fertilizer. They observed the growth of *Cyprinus carpio*, *Cirrhinus mrigala*, *Catla catla* responds positively. The bio-chemical composition of the activated sludge was Nitrogen: 6 %, total Phosphorus 1.29 %, Fatty acid: 6 % Vitimin B_{12} 76.8 µg/100g. Mustard oil cake with a combination of cowdung is used for manuring in fish ponds by Smith and Swingle (1942). According to their findings the manurial value i.e. nitrogen, phosphorus, fatty acid and vitimin B_{12} was 4.5 %, 1.5 %, .5 % .25 % respectively. The result that obtained from the bio-chemical composition of feed sample 3 is closly related to the above data. The body burns nutrients to make energy. The amount of energy that people need was available from their food in order to be healthy and active (King and Burgess 1992). In the present finding the Caloric contents in case of feed sample-1 (Table 266) was 350 kcal, in feed sample-2 (Table 266) was 218 kcal, in feed sample-3 (Table 266) was 420 kcal and in feed sample-4 (Table 266) was 347 kcal. From the above data it was observed that the Caloric contents of feed sample-3 was higher than in any other feed samples. The feed sample 4 was made from animal protein and feed sample 3 was made from plant protein. Mazid *et al.* (1987) found that a level of 400 kcal of energy in the diet was good for the growth of *Labeo rohita*. Different minerals like Ca^+, Mg^+, Zn^+, Cu^+, Fe^+ were the basic ingredients of the fish feed and they have significant role upon different physiological process. Calcium was essential for complete calcification of the body (Anderson *et al.* 1982). Magnesium played antagonistic role upon normal muscle development of the body (Krause and Mahan 1984). Iron has an active role upon oxygen transportation and blood cell development (Jaequot and Creach 1950). For the proper utilization of iron in the body, copper had an active role (Gopalan *et al.* 1978). In case of feed sample 3 Ca^+ was 307 mg/100g, Mg^+ was 253 mg/100g, Zn^+ was 537 mg/100g, Cu^+ was 92 mg/100g, where as in feed sample-4 Ca^+ was 492 mg/100g, Mg^+ was 417 mg/100g, Zn^+ was 2.94 mg/100g, Cu^+ was 85 mg/100g, Fe^+ was 14.82 g/100g. By considering feed cost and locally available feed ingredients and mineral constituents the performance of feed sample 3 seemed to be more cost effective and more affordable.

4.8. FISH GROWTH

4.8.a. Silver carp (Hypophthalmichthys molitrix) (Plate-22)

Silver carp was first introduced in Bangladesh from Hongkong in 1969. The stock was successfully bred and fry were distributed to different fish seed farm of the country for culture and propagation, because of its high yielding quality, the fish is much sought after by pond culturist through out the country. Silver carp attains maturity earlier than the local carp during the season and can be induced to breed (Rahman 1989). Silver carp is characterized by the possession of a compressed abdomen, protruding lower jaw, minute scales and silvery colouration. It feeds mainly on small phytoplankton by filtering algae through its very fine gill filter organ. The ability of Silver carp to feed on small algae make it especially suitable for polyculture (Ameen 1987).

By applying feed sample-1 in pond nos. 1, 2 in the first year the maximum body weight was 180 g and 191 g respectively. In second year it was 178 g and 185 g. By applying feed sample-2 in pond no. 3, 4 in the first year the maximum weight was 611 g and 648 g respectively. In second year it was 614 g and 641 g respectively. By applying feed sample-3 pond nos. 5, 6 in the first year the maximum weight was 802 g and 813 g respectively and in second year it was 796 g and 855 g respectively. By applying feed sample-4 in pond no. 7 in the first year the maximum weight was 901 g and in second year it was 932 g.

The specific growth rate of Silver carp was high in pond nos 5, 6 i.e. 1.59 and 1.63 where feed sample 3 was applied (Table nos 311).

Silver carp exhibited appreciable growth rate in different ponds. In our country the annual increase in weight of this species ranged from 700 to 1000 g (Ameen 1987) and 312 to 755 g (Ahmed and Alam 1989). Weight of above 500 g of Silver Carp has been reported as marketable size by Lakshmanan *et al.* (1971), Lin (1954) and Anonymous (1980) observed high growth rate of Silver Carp ranged from 560 g to 2000 g. During the present study it was observed that in July'98 the average daily growth of Silver carp was .45 g/day, .41 g/day, 1.29 g/day, 1.38 g/day, 1.48 g/day, 1.45g/day, 1.90 g/day in pond nos 1, 2, 3, 4, 5, 6, 7 respectively (Table nos 298).

In September'98 the average daily growth of Silver carp was 1.10 g/day, .90 g/day, 2.93 g/day, 3 g/day, 3.40 g/day, 3.50 g/day, 3.76 g/day in pond nos 1, 2, 3, 4, 5, 6, 7 respectively (Table nos 298). In December'98 the average daily growth of Silver carp was .25 g/day, .22 g/day, 1.61 g/day, 1.77 g/day, 2.45 g/day, 2.29 g/day, 2.58 g/day in pond nos 1, 2, 3, 4, 5, 6, 7 respectively (Table nos 298). According to Laksmanan *et al.* (1971) the daily growth of Silver carp in monsoon was 2.28 g/day, in winter 1.69 g/day, in summer 3.48 g/day. Michael and Smitherman (1980) found that the daily growth of Silver carp in summer was about 4.12 g/day. The present investigation agrees more or less with Laksmanan *et al.* (1971) and Michael and Smitherman (1990).

4.8.b. Catla *(Catla catla)* (Plate-23)

Catla is planktivorous surface feeder and is upturned mouth and the large gill rackers are adapted to feeding on the neumerous organisms floating in water. Catla is reported to grow very fast, even upto 7.5 cm to 12.5 cm per month. In normally stock water a growth of 37 cm to 45cm in the first year can be expected (Karim 1975).

By applying feed sample-1, in pond nos.1, 2 during the first year the maximum weight of Catla was 90 g and 86 g respectively and in the second year it was 80 g and 87 g respectively. By applying feed sample-2, in pond nos. 3, 4 during the first year the maximum weight was 311 g and 320 g respectively and in second year it was 301 g and 333 g respectively. By applying feed sample-3, in pond nos. 5, 6 during first year the maximum weight was 340 g and 308 g respectively Similarly in the second year the final weight was 316 g and 320 g respectively. By applying feed sample-4, in pond no.7 during the first year the maximum weight was 370 g and in the second year it was 380 g.

The specific growth rate of Catla was high in pond nos 5, 6 i.e. 1.35 and 1.40 where feed sample 3 was applied (Table nos 311). The growth of Catla ranged from 205 to 908 g in Pakistan (Rabanal 1968), from 223 to 918 g in India (Laksmanan *et al.* 1971), from 500 to 700 g (Ameen 1987) and 213.6 to 663.3 g (Ahmed and Alam 1989), in Bangladesh. Alikunhi (1957) recorded 900 g as an average annual weight of Catla in India. During the present study the top layer fish population was distributed among the two varieties, i.e. Silver carp and Catla at 50 % basis, in order to neutralize the inter-specific competition in each studied pond. The adverse effect of Silver carp on the growth of Catla was observed by Alikunhi and Sukumaran (1964), Lakshmanan *et al.* (1971), Sukumaran *et al.* (1972), Zaher (1990) and Waheb *et al.* (1991). During the present study it was observed that in July'98 the average daily growth of Catla was 0.16 g/day, 0.20 g/day, 0.80 g/day, 0.83 g/day, 0.86 g/day, 0.80 g/day, 0.93 g/day in pond nos. 1, 2, 3, 4, 5, 6, 7 respectively (Table 299). In September'98 the average daily growth of Catla was 0.36 g/day, 0.33 g/day, 1.26 g/day, 1.30 g/day, 1.30 g/day, 1.33 g/day, 1.40 g/day in pond nos. 1, 2, 3, 4, 5, 6, 7 respectively (Table 299). In December'98 the average daily growth of Catla was 0.23 g/day, 0.23 g/day, 0.56 g/day, 0.66 g/day, 0.73 g/day, 0.53 g/day, 0.86 g/day in pond nos. 1, 2, 3, 4, 5, 6, 7 respectively (Table 299). Rabanal (1968) reported the average daily growth of Catla in July'68 was 2.10 g/day and in December'68 it was 1.10 g/day. Zaher (1990) in his finding mentioned the average daily growth was 2.86 g/day in August'90 and the highest daily average growth was in the month of May'90, that was 3.10 g/day.

By considering the daily average growth rate results that obtained by Lakshmanan *et al.* (1971) confirm the present findings.

4.8.c. Rui *(Labeo rohita)* (Plate-24)

Rui grows very fast, though perhaps relatively little slower than Catla. A growth of 35cm to 40cm can be expected in the first year in a well managed pond (Karim 1975). Rui eats vegetable detritus, microscopic plants and mud (Chowdhury and Lagler 1978).

By applying feed sample 1 in pond nos. 1, 2 during April'98-March'99 the maximum weight of Rui was 85 g and 80 g respectively and in second year it was 83 g and 82 g respectively. By applying feed sample 2 in pond nos. 3, 4 in the first year the maximum body weight was 230 g and 235 g respectively and in second year it was 218g and 237 g respectively. By applying feed sample 3 in pond nos. 5, 6 in the first year, the maximum body weight was 301 g and 280 g respectively. Similarly, in the second year the maximum body weight was 258 g and 291 g respectively. By applying feed sample 4 in pond no. 7 in the first year the maximum weight was 335 g. Similarly, in the second year the final weight was 338 g. The specific growth rate of Rui was high in pond nos 5, 6 i.e. 1.37 and 133 where feed sample 3 was applied (Table nos 311).

The growth rate of Rui ranged from 185 g to 1800 g, which had been reported by a number of researchers. Ahmed and Alam (1989) and Laksman *et al.* (1971) found annually 555 g Rui from an artificial pond in India. According to Hepher *et al.* (1981) the annual growth of Rui in India was 733 g from a commercial fish farm. Singha *et al.* (1973) reported the comparative good growth of Rui i.e. 811 g annually by special feed in West Bengal. During the present study in July'98 the average daily growth of Rui was 0.16 g/day, 0.16 g/day, 0.50 g/day, 0.53 g/day, 0.83 g/day, 0.83 g/day, 0.86 g/day in pond nos. 1, 2, 3, 4, 5, 6, 7 respecitvely (Table 300). In November'98, it was 0.20 g/day, 0.26 g/day, 0.73 g/day, 0.76 g/day, 0.93 g/day, 0.90 g/day, 0.86 g/day in pond nos. 1, 2, 3, 4, 5, 6, 7 respectively (Table 300). In February'98, it was 0.30 g/day, 0.26 g/day, 0.66 g/day, 0.63 g/day, 0.73 g/day, 0.60 g/day, 1.00 g/day in pond nos. 1, 2, 3, 4, 5, 6, 7 respectively (Table 300). Singha *et al.* (1973) reported in his finding the average daily growth of Rui was 2.10 g/day in July, and it was 1.65 g/day in November'73. The present result agreed, with that of Ahmed and Alam (1989).

4.8.d. Mrigal *(Cirrhinus mrigala)* (Plate-25)

Mrigal has relatively linear body, small head with rather blunt snout, terminal mouth with non-fringed lips, bright silvery body and reddish fin. It is a bottom fidder fish, though the young ones as soon as they commence feeding, have the same feeding habits as those of Catla and Rui. The growth of Mrigal is slower than Catla and Rui (Karim 1975).

By applying feed sample-1 in pond nos. 1, 2 during April'98-March'99 the maximum body weight of Mrigal was 132 g and 107 g respectively and in the second year it was 125 g and 113 g respectively. By applying feed sample-2 in pond nos. 3, 4 in the first year the maximum body weight was 389 g and 367 g respectively and in second year it was 360 g and 370 g respectively. By applying feed sample-3 in pond nos. 5, 6 in the first year the maximum body weight was 401 g and 390 g respectively Similarly in the second year the final body weight was 392 g and 403 g respectively. By applying feed sample-4 in pond no. 7 in the first year the maximum body weight was 435 g and in the second year it was 425 g.

The specific growth rate of Mrigal was high in pond nos 5, 6 i.e. 1.24 and 1.27 where feed sample 3 was applied (Table nos 311). Lakshmanan *et al.* (1971) obtained growth rate of Mrigal from 245 g to 983 g in five months. Sinha *et al.* (1973) recorded 571.4 g weight of Mrigal. In India Das *et al.* (1977) recorded 705 g weight of Mrigal. In Bangladesh, Ameen (1987) reported 300-500 g weight annually and Ahmed and Alam (1989) observed 380.6–584.4 g weight annually of Mrigal. During the present study it was observed that in July'98 the average daily growth of Mrigal was .36 g/day, .26 g/day, 1.20 g/day, 1 g/day, 1.16 g/day, 1.10 g/day, 1.10 g/day in pond nos 1, 2, 3, 4, 5, 6, 7 respectively (Table nos 301). In September'98 the average daily growth of Mrigal was .63 g/day, .53 g/day, 1.46 g/day, 1.50 g/day, 1.70 g/day, 1.53 g/day, 1.80 g/day in pond nos 1, 2, 3, 4, 5, 6, 7 respectively (Table nos. 301). In December'98 the average daily growth of Mrigal was .26 g/day, .20 g/day,.86 g/day, .86 g/day, .96 g/day, .96 g/day, 1 g/day in pond nos 1, 2, 3, 4, 5, 6, 7 respectively (Table nos 301). Ali and Islam 1981 in their work found Mrigal attained 603 g body weight in a big pond at Mymensingh. Sinha *et al.* (1973) found the similar result that confirm the present finding.

4.8.e. Carpio *(Cyprinus carpio)* (Plate-26)

The Common carp is also known as big belly carp. It is an omnivore, feeding on various food of plant and animal origin. Young carp feeds mainly as Protozoa and zooplankton like copepods and cladocerans. Growth of Common carp differs greatly in accordance with the factors like temperature, availability of food, stocking density, supply of supplementary feed etc. (Ameen 1987)

By applying feed sample 1 in pond nos.1, 2 in the first year the maximum body weight was 177 g and 175 g respectively. By applying feed sample 2 in pond nos. 3, 4 in the first year the maximum body weight was 480 g and 490 g respectively. By applying feed sample 3 in pond nos. 5, 6 in the first year the maximum body weight was 527 g and 508 g respectively.By applying feed sample 4 in pond no. 7 in the first year the maximum body weight was 690 g.

The specific growth rate of Carpio was high in pond nos 5, 6 i.e. 1.46 and 1.47 where feed sample 3 was applied (Table nos 311). In India Common carp attained 600-1000 g body weight annually where the stocking density was 2500 fry/ha (Jhingran 1982). According to Kaur (1987) the annual growth of Common carp was 1113 g. Markanday (1991) found that the annual growth of Common carp in a polyculture pond was 933 g. In Bangladesh Kohinoor *et al.* (1997) in their work upon the 3 species, *Ompok, Puntius* and *Cyprinus* in a mini pond at Rajshahi observed that the annual growth of Common carp was 1056 g. Markanday (1991) and FAO (1993) found the average growth of Common carp was 870 g annualy. Hashem *et al.* (1997) obtained 550 g body weight of Common carp annually. From the present study the average daily growth in July' 98 in pond nos. 1, 5, 7 was 0.43 g/day, 1.66 g/day, 1.46 g/day respectively (Table 302). In November'98 the daily growth in pond nos. 1, 2, 3, 4, 5, 6, 7 was 0.56 g/day, 0.53 g/day, 1.73 g/day, 1.93 g/day, 1.60 g/day, 3.00 g/day respectively (Table 302). In February'99 the daily growth in pond nos. 1, 2, 3, 4, 5, 6, 7 was 0.36 g/day, 0.40 g/day, 1.46 g/day, 1.26 g/day, 1.43 g/day, 1.50 g/day 2.00 g/day respectively (Table 302). Karim (1978) found in his research findings the daily growth of Common carp was 2.39 g/day in the month of September 1978. Similarly, in the finding of Hasem *et al.* (1997) the daily growth of Common carp was 2.03 g/day in the month of February 1997. Which confirms the present findings. In the present investigation the average growth of different varity of fishes maintains a positive correlation with different physico-chemical variables of water and other biological parameters. (Table nos. 304-309)

4.9. Fish Production

The production of fish depends on the proper use of scientific methods of fish culture in the country. In the present investigation the annual production per hectare during first year incase of pond nos. 1, 2, 3, 4, 5, 6, 7 were 1650 kg, 1601 kg, 5143 kg, 5126 kg, 6033 kg, 5813 kg, 6710 kg respectively and in second year these were 1668 kg, 1640 kg, 5050 kg, 5208 kg, 6147 kg, 5877 kg, 6630 kg respectively (Table-303).

Fish production estimated by different workers were different. Arvindakasham (1970) obtained in a polyculture yield was 5790 kg/ha/yr by stocking 10000 fingerlings/ha, with Silver Carp, Catla, Grass Carp and Common Carp. Lakshmanan *et al.* (1971) reported the average production of 4 speces (Rui, Catla, Mrigal, Silver) was 3062 kg/ha/yr. Sinha *et al.* (1973) reported 3232 kg/ha/yr production in six month. Mathews *et al.* (1974) reported an yield of 10148 kg/ha/yr with 6 species combinations. Chowdhuri (1975) obtained a yield of 9389 kg/ha/yr from West Bengal, India.

Sukumaran (1976) reported production as high as 5893 kg/ha/6 months from 6 species combination in India. The highest yield as achievable from multi species culture systems was due to proper utilization of all available fish food organisms. Multi species combination though gave better yield but availability of all fishes during stocking and the post stocking management was rather difficult and expensive. Maximum yield does not always reflect the economic profitability of the culture system and as such 4 or 5 species combination was desirable (MAEP 1997). Das *et al.* (1977) obtained 4823 kg/ha/yr carp production in India. Shaha *et al.* (1978) obtained a production of 4297 kg/ha/yr with inorganic fertilizers alone. Chakraborty *et al.* (1979) recorded a net production of 2134-2184 kg/ha/6 month with 5 species combination, where pond was fertilized with cowdung and inorganic fertilizer alone and the stocking density was 6000 fish/ha. The ponds of Chandpur irrigation project area yielded a production of 3300 kg/ha/yr (Baily 1982). Davis *et al.* (1983) recorded 1890 to 3820 kg/ha/yr. Ameen *et al.* (1986) obtained 3100 kg/ha/yr production. Islam (1995) harvested yields ranging from 6100-6370 kg/ha/yr in polyculture of carps in Bangladesh. The production obtained from the culture of carps in different ponds under present study seems to be satisfactory. This indicated that better management might increase fish production in a pond with better growth and survival rate of fishes.

4.10. Production economics

The cost of different feed samples was as follows:

Feed Sample-1

The cost of slurry was @ Taka 0.25/kg.

Feed Sample-2

The feed sample was made from slurry and mustard oil cake at 60:40 ratio.

So the feed cost.

60 kg slurry	@ Taka 0.25	= Taka 15.00
40 kg mustrad oil cake	@ Taka 8.50	= Taka 340.00
100 kg feed cost		= Taka 355.00
1 kg feed cost		= Taka 3.55

So the feed cost of sample-2 was Taka 3.55 per kg.

Feed Sample-3

The feed sample was made from slurry and muster oil cake at 70:30 ratio.

So the feed cost.

70 kg slurry	@ Taka 0.25	= Taka 17.50
30 kg mustrad oil cake	@ Taka 8.50	= Taka 255.00
100 kg feed cost		= Taka 272.00
1 kg feed cost		= Taka 2.72

So the feed cost of sample-2 was Taka 2.72 per kg.

Feed Sample-4

The feed sample was purchased from the local market.

The feed cost was Taka 10.50 per kg.

In different ponds the feed sample nos. 1, 2, 3 were applied at wet weight basis. The feed sample-4 was applied at dry form.

In this context, the feed cost was Tk 0.25 per kg of sample 1, which was applied in pond nos. 1,2 . The ultimate profit margin for pond no. 1 was Taka 290077.20 /ha/yr and for pond no. 2 was Taka 29837.85 /ha/yr. The feed cost of feed sample 2 was Taka 3.55 per kg. This feed sample was used in pond nos. 3, 4, where the ultimate profit margin for pond-3 was Taka 40200.55 /ha/yr and pond-4 was Taka 51394.73 /ha/yr. The feed cost for feed sample 3 was Taka 2.72 per kg. This feed sample was applied to pond nos. 5, 6. The ultimate profit margin for pond no. 5 was Taka 1,11,601.57 /ha/yr and pond no. 6 was Taka 960009.94 /ha/yr. The feed cost of feed sample 4 was Taka. 10.50 per kg. This feed was applied to pond-7. The ultimate profit margin for pond no. 7 was Taka 58408.82 /ha/yr. It may be noted that feed sample 3 consisting of slurry and mustard oil cake at 70 : 30 ratio is the most cost effective feed, which was used in pond nos.5, 6. The maximum water depth in both year in both ponds was favourable.

5.00. Summary

The present study was carried out in two year programme i.e. April'98-March'99 and April'99 to March, 2000. Seven ponds and four feed samples were used during experimentation. The area (Table. 1.u) of each pond i.e. pond nos. 1, 2, 3, 4, 5, 6, 7 were 0.34 ha, 0.35 ha, 0.36 ha, 0.38 ha, 0.38 ha, 0.37 ha, 0.34 ha. Sample nos. 1, 2, 3 were made from bio-gas plant slurry and sample 4 was purchased from the local market, sample 4 was denoted here as control feed. The aim of the present investigation was to compare the performance of feed sample 4 with feed sample nos. 1, 2, 3 and thus to find a low cost feed for aquaculture. During the study, five fish species combination comprising Silver carp (*Hypopthalmichthys molitrix*), Catla (*Catla caltla*), Mrigal(*Cirrhinus mrigala*), Rui(*Labeo rohita*), Carpio (*Cyprinus carpio*) was cultured in semi-intensively managed ponds. During the study Silver and Catla were treated as surface feeder, Rui as column feeder, Capio and Mrigal as bottom feeder. The ratio among surface, column, bottom was 4 : 2 : 4 in the first year and 3 : 2 : 5 in second year. The ratio in the second year has been changed due to first growing exotic variety for market demand by the middle class buyer.

The different feed samples with the following basic ingredients were as follows:

Feed sample 1: Fish feed, exclusively made from bio-gas plant slurry. Feed sample 2: Fish feed, made from mustard-oil-cake and bio-gas plant slurry (40: 60). Feed sample 3: Fish feed, made for mustard-oil-cake and bio-gas plant slurry (30:70). Feed sample 4: Control feed (KRISHIKA-BRAND), purchased from local market.

Application of different feed samples in different ponds was as follows:

Sample-1:	Pond nos. 1, 2.
Sample-2:	Pond nos. 3, 4.
Sample-3:	Pond nos. 5, 6.
Sample-4:	Pond no. 7.

Different feeds were applied in each pond at 2.5 % of the fish body weight basis through out the year.

The objectives of the present investigation were to study:

a. Physico-chemical variables of water;

b. Qualitative and quantitative study of plankton and benthos;

c. Bio-mass study;

d. Efficacy of different feed ingredients;

e. Study of relative growth of selective fish species on monthly basis and

f. To find out the low cost fish feed;

The ciimatic factors during the present investigation were as follows:

No rainfall was recorded in December'98 in the first year and maximum (380 mm) was recorded in September'99 in the second year. Minimum average sunshine (4 hours) was recorded in August'98 in the first year and maximum sunshine (8.9 hours) was recorded in February'99 also in the first year. Minimum average humidity (60 %) was recorded in March, 2000 in second year and maximum (85 %) was also recorded in September'99 in the second year. The minimum water depth (160 cm) incase of pond no. 1 was recorded in May'98 in the first year and maximum (208 cm) was recorded in September'99 in second year. Incase of pond no.2 the minimum water depth (161 cm) was found in May'98 in the first year and maximum (201 cm) was in September'99 in the second year. Incase of pond no.3 the minimum water depth (155 cm) was recorded in May'98 in the first year and maximum (193 cm) in September'99 in the second year. Incase of pond no.4 the minimum water depth (155 cm) was recorded in May'99 in the second year and maximum (190 cm) in September'98 in the first year. Incase of pond no.5 the minimum water depth (160 cm) was found in May'98 in the first year and as well as in the second year and maximum (192 cm) was in October'98 in the first year. Incase of pond no.6 the minimum water depth (157 cm) was recorded in May'98 in the first year and maximum (194 cm) in September'98 also in the first year. Incase of pond no.7 the minimum water depth (155 cm) was recorded in May'98 in the first year and maximum (192 cm) in September'99 in the second year.

Incase of pond no.1 the water transparency ranged from 28.6 cm to 34.0 cm. The minimum water transparency was in January'99 in the first year and the maximum water transparency was in June'98 also in the first year. Incase of pond no.2 the water transparency varied from 28.7 cm to 39.6 cm, the minimum water transparency was in January'99 in the first year and maximum in January, 2000 in the second year. Incase of pond no.3 the water transparency ranged from 28.8 cm to 35.7 cm, the minimum water transparency was found in April'98 in the first year and maximum was in June'99 in the second year. Incase of pond no.4 the water transparency ranged from 29.0 cm to 35.9 cm, the minimum water transparency was in January'99 in the first year and maximum was in June'99 in the second year. Incase of pond no.5 the water transparency ranged from 28.7 cm to 34.7 cm, the minimum was in January'99 in the first year and maximum was in June'98 in the second year.

Incase of pond no.6 the water transparency ranged from 28.15 cm to 34.5 cm, the minimum water transparency was in January'99 in the first year and maximum was in June'98 also in the first year. Incase of pond no.7 the water transparency varied from 30.3 cm to 35.5 cm, it was minimum in February'99 in the first year and maximum was in June'98 also in the first year.

From the overall investigation in different ponds the average water transparency ranged from 28.15 cm to 39.6 cm. The minimum water transparency was in January'99 in the first year and the maximum was in January, 2000 in the second year.

During two year of the study period, the air temperature ranged from 21.1° C to 33.4°C. The water temperature ranged from 23° C to 33.5° C during two years study, the minimum and maximum water temperature was found in December'99 and April'99 in the second year.

In the present study the p^H ranged from 6.3 to 8.4, it was minimum in October'98 and maximum in March'99 in the first year and in second year it ranged from 6.4 to 7.9, it was minimum in February, 2000 and maximum in September'99 in different ponds.

The Carbon dioxide ranged from 5 mg/l to 13.2 mg/l in the first year and in second year it ranged from 5.3 mg/l to 12.7 mg/l in different ponds. The minimum and maximum amount of Carbon dioxide was in October'98 and November'98 in the first year. And in second year it was in February, 2000 and November'99 respectivly.

The Dissolved oxygen ranged from 6.5 mg/l to 12 mg/l in the first year and in second it ranged from 7 mg/l to 10.3 mg/l. The minimum and maximum dissolved oxygen was in July'98 and March'99 respectivly in the first year and in second year it was in October'99 and March, 2000 respectivly.

The Hardness ranged from 92 mg/l to 118 mg/l in the first year and in second year it ranged from 95 mg/l to 135 mg/l in different ponds. The minimum and maximum hardness was in June'98 and October'98 respectivly in the first year and in second year it was in June'99 and August'99 respectivly.

The Alkalinity ranged from 50 ppm to 120 ppm in first year and in second year it ranged from 61 ppm to 118 ppm. The minimum and maximum alkalinity was in May'98 and

July'98 respectivly in the first year and in second year it was in May'99 and September'99 respectivly.

Qualitative and quantitative studies were made on different groups of phytoplankton in different ponds. In the present study Chlorophyceae, Cyanophyceae, Bacillariophyceae, Euglenophyceae were detected, Among them, Chlorophyceae was the dominant group. During first year the average number of Chlorophyceae ranged from 9113 individuals/l to 22810 individuals/l and in second year it ranged from 6387 individuals/l to 22098 individuals/l. Cyanophyceae ranged from 4581 individuals/l to 12575 individuals/l in the first year and in second year it ranged from 4481 individuals/l to 13502 individuals/l in the second year.

Euglenophyceae ranged from 1875 individuals/l to 6577 individuals/l in the first year and in second year it ranged from 2484 individuals/l to 7496 individuals/l. Bascillariophyceae ranged from 3694 individuals/l to 9934 individuals/l in the first year and in the second year it ranged from 4032 individuals/l to 9181 individuals/l.

Quantitative and qualitative studies of zooplankton were also done during the study period. In the present finding Rotifera, Cladocera, Copepoda, Ostracoda, Nauplius were identified. There were 11 genera of Rotifera, 5 genera of Cladocera, 2 genera of Copepoda and 2 genera of Ostracoda in the waters of different ponds. During first year of study period Rotifera ranged from 1825 individuals/l to 5209 individuals/l and in second year it ranged from 1693 individuals/l to 4788 individuals/l. Cladocera ranged from 1977 individuals/l to 3230 individuals/l in the first year and in second year it ranged from 1612 individuals/l to 3915 individuals/l. Ostracoda ranged from 983 individuals/l to 2175 individuals/l, in the first year and in second year it ranged from 1060 individuals/l to 2809 individuals/l. Nauplius ranged from 1309 individuals/l to 2213 individuals/l in the first year and in the second year it ranged from 1237 individuals/l to 2677 individuals/l.

Different macrobenthic groups were found i.e. Oligochaeta, Chironomids and 4 genera of Mollusca. Their quantitative study was done at generic level. During the two years of study Oligochaeta ranged from 947 individuals/m^2 to 3059 individuals/m^2 in the first year and in the second year it ranged from 1048 individuals/m^2 to 2889 individuals/m^2. Chironomid ranged from 912 individuals/m^2 to 1748 individuals/m^2 in the first year and in second year it ranged from 1048 individuals/m^2 to 2889 individuals/m^2 in different ponds.

Mollusca ranged from 295 individuals/m^2 to 680 individuals/m^2 in first year and in second year it ranged from 342 individuals/m^2 to 1128 individuals/m^2.

In the present finding estimation of Plankton bio-mass was done at dry and wet weight basis. The wet weight of Plankton ranged from 16.10 mg/l to 81.3 mg/l in first the year and in second year it ranged from 15.80 mg/l to 80.10 mg/l in different ponds. Similarly, the plankton bio-mass in dry weight basis ranged from 2.21 mg/l to 7.30 mg/l in the first year and in the second year it rangd from 2.12 mg/l to 7.78 mg/l in different ponds.

During the study period four feed samples were used. Proximate composition of these feed samples was done by bio-chemical method. In the dry state, the protein contents ranged from 18.15 mg/100g to 29.73 mg/100g, fat contents ranged from 5.87 mg/100g to 9.30 mg/100g, caloric content ranged from 218 k.cal to 420 k.cal.

The selective species in the present investigation were Silver carp, Catla, Rui, Mrigal, Carpio. In the first year the surface fish population number was adjusted equally by Silver carp and Catla. Bottom fish population was similarly and equally adjusted by Mrigal and Carpio. Column fish population was represented by only Rui. In the second year the fish population as surface feeder was adjusted by Silver carp and Catla at the ratio of 80 % and 20% basis, bottom fish population was adjusted by Mrigal and Carpio at 30 % and 70 % basis.

Different type of feed samples were applied in different ponds and ultimately different growth of fishes were procured. In case of Silver carp the growth in the first year ranged from 180 g to 901 g, in the second year it ranged from 178 g to 932 g. The average daily growth was maximum in the month of September'98 and March'99 i.e. the average daily growth ranged from 0.90 g/day to 3.76 g/day was in Sept'98 and daily growth ranged from 0.54 g /day to 3.03 g/day was in March'99. In case of Catla the growth in the first year ranged from 90 g to 370 g the average daily growth was maximum in October'98 i.e. it ranged from 0.46 g/day to 1.73 g/day in the second year the growth of catla ranged from 80 g to 380 g. In case of Rui the growth in the first year ranged from 85 g to 335 g. The average daily growth was maximum in October'98 i.e. the daily growth in that month ranged from 0.43 g/day to 1.66 g/day. During second year the growth of Rui ranged from 82 g to 338 g. In case of Mrigal the growth in the first year ranged from 107 g to 435 g and in second year it ranged from 113 g to 425 g. The average daily growth during first year was maximum in

October'98 i.e. it ranged from 0.60 g/day to 2 g/day in that month. In case of Carpio the growth in the first year ranged from 171 g to 690 g and in second year from 179 g to 658 g. The average daily growth during first year was maximum in October'98 when it ranged from 0.66 g/day to 3.83 g.day.

During two years study period different feed samples were applied in different ponds by applying feed sample nos. 1, 2, 3, 4 the production ranged from 1610 kg/ha/yr to 1668 kg/ha/yr, 5050 kg/ha/yr to 5208 kg/ha/yr, 5813 kg/ha/yr to 6147 kg/ha.yr, 6710 kg/ha/yr, respectively.

Considering the cost benefit analysis the profit margin per ha/yr in case of feed sample-1, ranged from Taka 29077.20 to Taka 29837.85, in case of feed sample-2, it ranged from Taka 40200.55 to Taka 51394.73, in case of feed sample-3, it ranged from Taka 96009.94 to Taka 111601.57, in case of feed sample-4 it came Taka 58408.82.

By comparing all the factors the performance of feed sample-3 was good enough and maximum fish production with maximum profit margin was obtained when the feed ingredients were easy available with low cost, which was very easy to procure by the fish culturist. The rate of feed was Taka 2.72 /kg at wet weight basis, which was quite cheap for the over all fish culture practice in Bangladesh.

6.0. Conclusion

Bangladesh is an over populated country and its food production is not enough for the rapid growing population. As a result most of the people of the country have been suffering from shortages of animal protein in their diet. Bangladesh has a vast water areas including numerous close water-bodies, there is a great possibility for culturing commercially and biologically important fast growing and genetically, improved fresh water fish species. The study was carried out in an Agricultural firm from where slurry as a by-product of bio-gas plant was used as basic ingredient of fish feed. Different formulated feeds i.e. feed sample no. 1, 2, 3 were made from slurry and were applied in 6 different ponds, in two years of study period. A control feed i.e. sample 4 was used in another pond to compare the result. In the present investigation, observations were made on water quality, quantitative and qualitative study of plankton, benthos, bio-mass, bio-chemical efficacy of different formulated feeds and relative growth of selected carp varieties i.e. Silver carp, Catla, Rui, Mrigal, Carpio.

The following is the brief conclusion of the results obtained during the course of study.

1. Climatic factors

(a) Rainfall: Water bodies in Bangladesh were expected to be profoundly affected by the rainfall. During the two years investigation, there was no rainfall in December'98 in the first year and maximum (380 mm) rainfall was recorded in September'99 in the second year. It was concluded that the rainfall had no adverse effect on consequent seasonal fluctuation in water level which ultimately influenced the physico-chemical condition of water and production of planktons in the present investigation.

(b) Sun-shine: Hours of sun-shine had direct role in the photosynthesis of green plants i.e. Phytoplanktons present in water. In the present investigation minimum average sunshine (4 hours) was recorded in August'98 in the first year and maximum (8.9 hours) was in February'99 in the first year. Which had a positive role for the homogenous distribution of biogenic gases and nutrients which were in turn used up by the planktonic organism.

(c) Humidity: During the present investigation the minimum average humidity (60 %) was recorded in March, 2000 in second year and maximum (85 %) was also recorded in September'99 in second year. Which was characteristic of the tropical countries. It had direct relation with rainfall which ultimately maintained a positive correlation with the physico-chemical variables of water.

2. **Physical factors:**

(a) Water depth: In the present investigation the water depth ranged from 155-208 cm in different ponds. The minimum water depth (155 cm) was recorded in May'99 in the second year in pond no.4 and maximum (208 cm) was recorded in pond no.1 in September'99 in second year. The maximum water level was due to heavy rainfall in the period and minimum water level was due to excessive loss of water by surface evaporation and leaching of soil compactibility. Water depth had an inverse relation with fish production and in the present finding water depth in all the ponds were found to be suitable for fish culture.

(b) Water transparency: In the research finding the minimum water transparency (28.15 cm) was recorded in January'99 in the first year in pond no.6 and maximum (39.6 cm) was recorded in pond no.2 in January, 2000 in second year. The transparency of a water body normally indicated its productivity and usually affected by several factors i.e. silting, suspended organic matters, intensity of sunlight etc. Through out the study period transparency expressed that light penetration was maximum in June due to heavy rainfall, but the overall transparency supported the productivity of the investigated ponds.

(c) Temperature: In the investigation the air temperature ranged from 21.5°C to 33.4°C. Where as the water temperature ranged from 22.5°C to 33.5°C. In a number of way temperature of water can affect the growth and life cycle and limit the distribution range of fresh water animal. During the study period water temperature in all the ponds was closely related to the air temperature. In the investigated ponds, the temperature both air and water had positive correlation with fish production.

3. **Chemical factors:**

(a) Hydrogen-ion concentration (P^H): In the present investigation the p^H ranged from 6.3 to 8.4. Among the different chemical variables of water, p^H affects the seasonal variation of aquatic organisms and found to be inversely related to the temperature and CO_2. In the present finding the p^H was slightly alkaline, which was most suitable for fish culture.

(b) Carbon dioxide (CO_2): In the research finding the CO_2 amount ranged from 5 mg/l to 13.2 mg/l. It is the minor component of air and is quite abundant in the water because of its greater solubility. The hydration reaction of water due to CO_2 might have limited the photosynthetic rate for a short time during calm days. The recent finding concluded the low level of CO_2 due to low decomposition of organic matter and high level due to high rate of photosynthesis with high precipitation of CO_2. The result was optimum which was quite suitable for fish culture.

(c) Dissolved Oxygen (DO): In the present finding the amount of DO ranged from 6.5 mg/l to 12 mg/l. Oxygen is consumed continuously in respiration by both plants and animals in water and is produced by plant photosynthesis during day time. The minimum level of DO was due to respiration by living organisms and organic decomposition, where as the maximum level was due to high photosynthetic rate. However, the investigated result was very much suitable for fish culture.

(d) Hardness: In the research finding the amount of hardness of water ranged from 92 mg/l to 120 mg/l. Which was directly related to the primary productivity. The value of the hardness from the present finding was within limit i.e. moderate condition of soft and hard water which was suitable for fish culture.

(e) Alkalinity: In the present finding the amount of alkalinity of water ranged from 70 ppm to 120 ppm. The alkalinity commonly means the concentration of carbonate, bi-carbonate and hydroxide ions in water. The nutrition accumulation was higher in alkaline water than in acidic water. The present data shows that the alkalinity of water was moderate, which was suitable for fish culture.

4. Phytoplankton:

In the present finding after application of different feed samples in different ponds the phyttoplankton population was different. On the basis of population abundance, the groups were ranked as follows: Chlorophyceae>Cyanophyceae>Euglenophyceae> Bacillariophyceae. By applying feed sample 1 in pond nos. 1, 2 in both the year the population abundance of phytoplankton ranged from 11310 individuals/l to 40503 individuals/l. When feed sample 2 was applied in pond nos. 3, 4 it ranged from 5113 individuals/l to 73745 individuals/l in both the year. By applying feed sample 3 in pond nos. 5, 6 it ranged from 18232 individuals/l to 70380 individuals/l in both the year. By applying feed sample 4 in pond no. 7 population abundance ranged from 21181 individuals/l to 66018 individuals/l in both the studied year. Ponds nos. 5, 6 were found to be rich in phytoplankton fauna indicating the influence of bio-gas slurry in enhancing the phytoplanktonic production.

5. Zooplankton:

In the present investigation qualitative and quantitative observations were made on monthly basis. By applying feed sample 1 in pond nos. 1, 2 in both the year the population abundance of zooplankton ranged from 7189 individuals/l to 11908 individuals/l. When feed sample 2 was applied in pond nos. 3, 4 it ranged from 9804 Individuals/l to 24323 individuals/l in both the year. By applying feed sample 3 in pond nos. 5, 6 it ranged from 8110 individuals/l to 21856 individuals/l in both the year. By applying feed sample 4 in pond no.7 it ranged from 10011 individuals/l to 23370 individuals/l in both the studied year.

In the two years research period the zooplankton expressed progressive increase in their number in different month of the year with specific seasonal variation. All the research pond under the present study was stocked with moderate number of carps and that the grazing effects by the carps might have reduced the zooplankton abundance in the ponds to some extent. The variations in the zooplankton population abundance could result from the variation in nutrients, water chemistry and other factors. For which, in the present investigation fishes attained different growth by applying different feed samples in different researched pond. Ponds nos. 5, 6 were found to be rich in zooplanktonic fauna, indicating the influence of bio-gas slurry in enhancing the zooplanktonic production.

6. Benthos:

During the present investigation the quantitative and qualitative estimations of the macrobenthos were done. By applying feed sample 1 in pond nos. 1, 2 in both the year the population abundance of benthos ranged from 1804 individuals/m^2 to 3179 individuals/m^2. When feed sample 2 was applied in pond nos. 3, 4 it ranged from 1813 individuals/m^2 to 7177 individuals/m^2 in both the year. By applying feed sample 3 in pond nos. 5, 6 it ranged from 1834 individuals/m^2 to 5833 individuals/m^2 in both the year. By applying feed sample 4 in pond no.7 it ranged from 2928 individuals/m^2 to 9008 individuals/m^2 in both the studied year.

All the investigated ponds appeared to be more or less rich in their macrobenthic fauna. The abundance of benthos mainly depends on the nature, type of bottom sediments, availability of sub-merged aquatic vegetation, decaying organic debries and other ecological factors associated with the grazing pressure on them by fish. The use of different sample of fish feed i.e. made from bio-gas slurry favour the growth of benthic organisms in the studied ponds. On that basis the performance of feed sample 3 in pond nos.5, 6 was considerably better.

7. **Planktonic bio-mass:**

In the present finding, the bio-mass was based upon the dry weight and wet weight of plankton. These estimation served as a good indicator of different pond productivity. In the research work the constant wet weight of planktonic bio-mass ranged from 14.8 mg/l to 81.3 mg/l and in constant dry wet weight basis it ranged from 2.98 mg/l to 7.98 mg/l in two years research period in different ponds. By considering the data of different ponds all the ponds were more or less productive. It may be noted that planktonic bio-mass production in pond nos.5, 6 was moderate.

8. **Proximate composition of feed samples:**

In the present investigation different feed samples were used by bio-chemical analysis. The efficacy of feed sample-3 was the best, the ash quantity was 11.04 %, the protein content was 28.12 mg/100g, fat content was 9.30 mg/100g, carbohydrate 51.32 mg/100g, caloric content was 420 kcal. The basic ingredients of feed sample-3 was bio-gas plant slurry and mustard oil cake at 70:30 ratio.

9. **Fish production:**

During the present investigation in both the year, by applying feed sample 1 in pond nos. 1, 2 the production ranged from 1601 kg/ha/yr to 1668 kg/ha/yr. When feed sample 2 was applied in pond nos. 3, 4 the production ranged from 5050 kg/ha/yr to 5208 kg/ha/yr. By applying feed sample 3 in pond nos. 5, 6 the production ranged from 5813 kg/ha/yr to 6147 kg/ha/yr. By applying feed sample 4 in pond no.7 the production ranged from 6630 kg/ha/yr to 6710 kg/ha/yr. It may be noted that the high rate of production of fish in control pond was due to application of costly commercial feed. In pond nos.5, 6 where feed sample 3 containing slurry and mustard oil cake was applied the production was comperatively higher.

10. **Economics:**

In the present investigation the profit margin in case of feed sample 1, it ranged from Tk. 29077.20 to Tk. 29837.85. In case of feed sample 2, it ranged from Tk. 40200.55 to Tk. 51394.73. In case of feed sample 3 it ranged from Tk. 96009.94 to Tk. 111601.00. In case of feed sample 4 it came Tk. 58408.82. The highest profit margin was obtained in pond nos.5, 6 where feed sample 3 containing slurry and mustard oil cake was applied.

11. **Comment:**

By comparing all the factors the performance of feed sample 3 was satisfactory by the use of which maximum fish production with maximum profit margin was obtained. The ingredients of feed sample 3 were easily available with low cost to the fish culturist. The rate of feed sample 3 i.e. Taka 2.72 /kg at wet weight basis which was quite cheap. The important fact is that bio-gas plant slurry is easily available material and can be used as a feed ingredients that may play a vital role as feed of fish in an integrated agricultural firm.

7.0. REFERENCE

Abraham, Mathew, 1976. Studies on the bottom macro-fauna of Bhavanisagar Reservoir (Tamilnadu). J. Inland Fish. Soc. India. 11(2): 41-48pp.

Ahmed, A.K.M.M. and Alam, M, I. 1989. Polyculture of cultivated fish species for optimizing production from ponds. Workshop on contrast Research project, Agri. Res. Coun. Dhaka. Bangladesh. 13p.

Akter, J.N., Mazid, M.A., Rahman, M.A., Pramanik, M.W.A. and Rahman, M.K. 1992. Growth response of *Catla catla* (Hamilton) fingerlings fed iso-calorie diets with variable protein levels. Bangladesh J. Zool., 21 (1): 87-94pp.

Allenson, B.R. 1961. Investigation into the ecology polluted inland waters in the Transvael. Hydrobiol. 18: 1-74pp.

Aleem, N.A. 1983. Limnology and some biological aspects of Chinese Silver carp, *Hipopthalmichthys molitrix* (Val) in a fish pond with semi-intensive management at Raipur, Noakhali, M. Sc. Thesis, Department of zoology, Dhaka University. 88pp.

Ali, S., Haque, A. S.M., Oppenheimer, J.R. and Aziz, K.M.S. 1978. Studies on the bottom fauna of three fish ponds in Dhaka city, Bangladesh, J.Zool. 6(1): 43-55 pp.

Ali, M.M. and Islam, A. 1981. Studies on the food of *Labeo rohita* (Ham), *Catla catla* (Ham), *Cirrhinus mrigala* (Ham) in a pond of Bangladesh Agriculture University Fish firm. Proc. 3rd Nat. Conf. Dhaka, Bangladesh. 152-158 pp.

Ali, S., Rahaman, A and Majid, A 1981. Studies on benthic macro-invertebrate production 3rd. Nat. Zool. conf. Dhaka, Bangladesh. 145-154 pp.

Ali, M.L. 1991. Open water fish stocking. A Tool for management of the fisheries resources. Annual conference and general meeting, 1991. Zoological society of Bangladesh. University of Dhaka, Bangladesh.

Ali, S. 1992. Fresh water invertebrates of Bangladesh. Bangla Academy. Dhaka-1000.

Ali, M.L. 1995. Open water fish stocking. A tool for management of the fisheries resource. Annual conference and general meeting, 1995. Zoological society of Bangladesh. University of Dhaka, Bangladesh.

Alikunhi, K.H.1957. Fish culture in India. Fm. Bull. Indian Coun. Agri. Res. (20): 144p.

Alikunhi, K.H., Sukumaran, K.K. & Parameswaran, S. (1971). Studies on composit fish culture: Production by compatible combinations of Indian and Chinese carps. Jounnals of the Indian Fisheries Association, 1(1): 26-57 pp.

Ameen, M., Begum, Z.N.T., Ali, S., Rahaman, P.M.M. and Roy, T.K. 1986. A comparative Limnolgical study of two ponds in Raipur. Dhaka Univ. Stud. Pt. E. 1(1:) 25-34 pp.

Ameen, M. 1987. Fisheries resources and opportunities in fresh water fish culture in Bangladesh. Pat. NRD- 11/DANIDA. Noakhali, Bangladesh. 24 p.

Anderson, H., Dibble, M.V., Turki, P.R., Mitchell, H.S., Rynbergen, H.J. 1982. Nutrition in Health and Disease. 7th ed. T.B. Lippineott Company. Philadelphia, Toronto, U.S.A. 66 p.

Anonymous. 1970. Manual on the bio-technology of the propagation and rearing of phytophagus fishes. (Transl. frim Russian by R.M Howland 1971). Moscow, Fishery ministry of the USSR, All-Union Scientific Research, Institute of Pond Fishery. 49 p.

Anonymous. 1980. Pond fish culture in China Pearl River fish. Int., China Nat. Bus. Aqua. Prod. Guangzhou, China. 106 p.

Anonymous. 1980. Pond fish culture in china. Pearl River. fish. inst. China. Nat. Bus. Aqua. Prod. Gaungzhou, China-136 p.

Anonymous. 1983. Studies on the limonlogy in a mini pond and growth rate of *Tilapia nilotica* (Linnaeus 1958). M.Sc. Dissertation, Department of Zoology, Dhaka University 78 p.

Anonymus. 1986. In Vitro study of Plankton growth due to different inorganic fertilizer doses. M.Sc. Dissertation, Department of Zoology, University of Dhaka, 109 p.

Anonymous. 1992. Studies on Macrobenthos fauna of integrated fish cum chicken farming pond. M.Sc. Dissertation, Department of Zoology, Dhaka University.

Anonymous. 1995. Studies on the bio-mass of plankton in a pond of Chittagong University campus. M.Sc. Dissertation Department of Zoology, Chittagong University. 110 p.

APHA. 1975. Standard Methods for the determination of water and wastewater. Washington D.C. 1193 p.

APHA. 1985. Standard methods for the examination of water and waste waters. 16th ed. APHA. AWWA. WPCF, Washington, 1268 p.

Arora, H.C. 1966. Rotifera as indicator of eutrophic nature of environment. Hydrobiologia (27): 146-159 pp.

Arvindakasham, C., Chatergee, M.C. 1970. Composite culture at Rathore. India. J. Inland. Fish. Soc. 7:195-200 pp.

BAFRU. 1990. Water quality management for Aquaculture and Fisheries. Bangladesh. 44 p.

Bailey, W.M. 1982. Agriculture development in Bangladesh Proc. 3rd seminar maximum Livestock production from minimum Inland. BARI. Joydevpur, Dhaka. 299-310 pp.

Banerjee, S.M. 1967. Water Quality and Soil Condition of fish pond in some states of India in relations to fish production, India J. Fish. (14): 115-144 pp.

Banerjee, R.K., Singit, G.S. and Ray, P. (1969). Some observations on the use of poultry manure as fertilizer in rearing major carp fry. Ibid, 16 (1 & 2): 29-34 pp.

Banerjee, R.K., Pakrasi, B.B. and Basu, N.C. 1978. Utilization of human and cattle urine in increasing fish production. Indian J. Agric. Chem., 11(1): 27-37 pp.

Banerjee, R.K., Ray, P., Singit, G.S. and Dutta, B.R. 1979. Poultry droppings its manurial potentiality in aquaculture. J. Inland Fish. Soc. India, 11(1): 94-108 pp.

Banu, A.N.H, Ali, M.M. and Islam, A. 1987. Plankton study of some selected ponds in different location of Bangladesh. Bangladesh j. Aquaculture (9): 55-59 pp.

Bardach, J.I., Ryther, J.I. and Mclarney, W.O. 1972. Aquaculture. Wilay Inter-science, N.Y. 868 p.

Begum, A., Mustafa, G., Ali, S. and Ahmed, Kh. 1982. Studies on limnology in a mini pond and growth of *Tilapia*. Bang. J. Zool. 17(1): 35-45 pp.

Begum, Z.N.T. and Alam, M. J. 1985. Plankton abundance in relation to physico-chemical variable in two ponds in Maijdee Court, Noakhali. J. Asiatic. Soc. Bangladesh (Sci) 13: 55-63 pp.

Begum, Z.N.T. and Alam, M.S. 1987. Plankton abundance in relation to physico-chemical variable in two ponds in Maijdee Court, Noakhali. J. Asiatic. Soc. Bangladesh (Sci) 13: 55-63 pp.

Begum, Z.N.T. and Alam, M.S. 1987. Plankton abundance in relation to physico-chemical variables in two ponds in Maijdee Court, Noakhali, J. Asia Soc. Bangladesh (Sci) 18:55-63 pp.

Begum, Z.N.T., Islam, A.K.M.N. and Chowdhury, S.B. 1987. Studies on the Chemical composition of three Green Algae. Bangladesh J. Bot. 16 (2): 219-220 pp.

Begum, S., Chowdhury, A.N., Sufi, G.B. and Sultana, N. 1992. Rotifers in a fish pond. Their occurrence and seasonal variation. Dhaka Univ. J. Biol. Sci. (1): 15-18 pp.

Bhuiyan, A.M. 1974. Studies on the seasonal changes of plankton. Proc. Fourth-Nat. Zool. Conf. Bangladesh. 88-91 pp.

Boyd, C.E. 1968. Fresh Water Plants. A Potential source of Protein. Econ. Bot. (22): 359-368 pp.

Boyd, C.E. 1982. Water quality management for pond fish culture. Elsevier Science Publ. B.V., 1000 AH Ameterdam, The Netherlands. 318 p.

Briggs, G.M. and Calloway, D.H. 1979. Nutrition and physical fitness, 10TH ed. Saunders College Publishing Co. Philadelphia. 236 p.

Carter, G.S. 1968. Tropical Climates and Biology of nature (London) (1): 187-843 pp.

Chakraborty, R.D., Roy, R. and Singh, S.B. 1959. A quantitative study of the plankton and the physico - chemical conditions of the river Jumna at Allahabad in 1954-55. Ind. J. Fish o(1): 185-203 pp.

Chakraborty, R.D. 1972. Composit culture of Indian and exotic fishes. Souvenir, Silver Jubilee of CIFRI, Barrackpur: 25-29 pp.

Chakraborty, R.D., Sen, P.R., Chatterjee, D.K. and Jena, S. 1975. On the use of fertilizer and supplementary feed for enhancing fish production in freshwater ponds. Proc. Nat. Acad. Sci, India, (B), 45(3): 192-196 pp.

Chakrabarty, R.D., Rao, N.G.S., Sen, P.R. 1979. Culture of fish in ponds with fertilization. In symposium on Inland Aquaculture, Barrackpore, West Bangle, India. 56 p.

Chawla, O.P. 1986. Advances in biogas technology. ICAR. New Delhi. 144 p.

Chawdhury, H., Chakrabarty, R.D., Rao, N.G.S., Janakiram, K., Chatterjee, D.K. & Jena, S. 1974. Record fish production with intensive culture of Indian and exotic carps. Curs. Sci., 43(10): 303-404 pp.

Chawdhury, H., Chakrabarty, R.D., Sen., R.R., Rao, N.G.S. and Jena, S. 1975. A new light in fish production in India with record in yields by composite fish culture in freshwater ponds. Aquaculture. (6): 343-355 pp.

Chawdhury, A.Q. and Lagler, K.F. 1978. Fishery development in irrigation and flood control system. Snell Environmental group, Michigan, USA.

Chawdhury, H., Lakshmanan, M.A.V., Rao, N.G.S., Saha, G.N., Roat, M. and Kanaujia, D.R. 1978. Record fish production through intensive fish culture in a farmers pond. J. Inland fish. Soc. India, (10): 19-27 pp.

Chowdhury, S.H. and Mazumder, A. 1981. Limnology of lake Kaptai, physico-chemical feature. Bangladesh J. Zool (94): 45-72 pp.

Chowdhury, S.H. and Mazumder, A. 1987. Limnology of lake Kaptai, physico-chemical features. Bang. J. Zool. 17(2): 101-106 pp.

Chowdhury, A. N., Begum, S and Sultana, N. 1989. Occurrence and variation of Zooplankton in a fish pond in relation to some physico-chemical factors. Bangladesh. J. zool. 17(2): 101-106 pp.

Chowdhury, A.N., Begum, S. and Sultana, N. 1992. Physico-chemical and biological parameters affects the occurrence and seasonal of ostracodes in a tropical fish pond. Bangladesh J. Zool. 20(2): 315-323 pp.

Clement, G., Giddey, C. and Mengi, R. 1967. Amino Acid composition and nutritive value of the Alga *Spirulina maxima*. J. Sci-Food Agric. (18): 497-501 pp.

Das, S.M. and Srivastava, V.K. 1956a. Quantitative studies on freshwater plankton of fish tank in Lucknow, India, Proc. Nat Acad. Sci, India. B-(26): 85-92 pp.

Das, N.G., Bhuiuan, A. L. 1974. Limnoplakton of some inland water of Dhaka city: Bangladesh. J. Zool. 2(1): 27-42pp.

Das, P., Sinha, M., Dumar, D., Chakrabarty, D.P. and Roy, M.K. 1977 Culture of Indian crops with record yield in a demonstration pond. J. Inland fish soc. India, 7 p.

Das, M., Islam, A.M. and Ali, M.M. 1981, Study on the bio-dynamics of the bottom macro-fauna of an artificial pond. Psoc. 3rd Nat. Zool. Conf.170-177pp.

Davis, N. T. and Hillary, R. 1978. An Evaluation of the Phytate Zinc, Copper, Iron, Manganese from soya-based texture. Vegetable Protein, meat substitute or meat extenders, Br.J. Nutri. Vol. 41:p. 579-85 pp.

Davis, C.H., Bhuiyan, A.R., and Ameen, M. 1983. Fish production in managed farmers ponds with different feeding and stocking model. BAU, Maymensingh. Proc. 4th seminar. 111-129 pp.

Dewan, S. 1973. Investigation into the ecology of fishes of a lake in Mymensingh. A Ph.D thesis submitted to the Department of Agriculture and Management, Faculty of Fisheries, BAU, Mymensingh. 345pp.

DOF. 1985. Water area statistics of Bangladesh. Fisheries Information Bulletin, Vol. 3(1). Dhaka.

DOF. 1998. Annual Report for the year 1998. Ministry of Fisheries and Livestock, Dhaka. 127-129 pp.

DOF. 2000. Annual Report for the year 2000. Ministry of Fisheries and Livestock, Dhaka. 111-113 pp.

Diepru, H.K. 1969. Influence of Corn oil and beef tallow on growth of channel cat fish. U.S. Dep. Intensive Bur. Sport. Fish. Wildl. Teel. 27: 13pp.

Durve, V.S. and BAL, D.V. 1961. Hydrobiology of the kelwa back water and adjoining sea. J. Univ. Bombay, 29(3-5): 39-48pp.

Edmonson, W.T. 1959. Fresh water biology, second J. Wiley and Sons. New York. N. Y. 1248pp.

Ellis, M.M. 1937. Detection and measurement of stream pollution. Bull. U.S. Bus. Fish Washington. 48:365-367pp.

FAO. 1993, Annual Report on Fisheries resorces of Bangladesh. BARC. CD. EF. 481-520pp.

FFYP. 1990-95, Fourth five year plan 1990-95. Cited in BBS, 1993. 670 - 729pp.

Folch, J., Lees, M. and Sloane-stanby, G.H. 1957. A simple Method for the Isolation and purification of total lipids from animal tissue. J. Biol. Chem. 226:497- 509pp.

George, M.G. 1964. Comparative plankton ecology of five fish tanks in Delhi, India, Hydrobiol., (27): 81-108 pp.

Ghosh, Apurba, Kuljeet, K., Bhanot and Saha, S.K. 1979. Use of domestic sewage in fish culture. Souvenir: In commenoration of the ICAR golden jubilee year, CIFRI, Barrackpore, 90-95pp.

Goldman, C.R. and Horne, A.J. 1983. Limnology. Mcgraw - Hill Int. Book Co. Tokoy. 463 pp.

Gopalan, C. 1971. A Manual of Laboratory Techniques. National Institute of Nutrition, Hyderabad, India. 60-148pp.

Gopalan, C., Sastri Rama, B. V. and Balsubramanian. 1978. Nutritive value of Indian Foods. Hyderabad, India. 60-14pp.

Gopalakrishnan and Srinath, E.G. 1963. Some experimental observations on the use of activated sludge as fertilizer for fish culture. Proc. Ind. Acad. Sci. 57B(6): 379-388pp.

Govind, B.V. 1963. Preliminary studies on plankton of the Tungabhadra reservoir India J. Fish. X(1A): 148-153 pp

Gupta, S.D. 1976. Macro benthic fauna of Loni reservoir. Journal of Inland Fish. India 8: 49-59 pp.

Habib, M.A.B., Islam, M.A., Mohsinuzzaman, M. and Rahaman, M.S. 1984. Effect of some physico-chemical factors of water on the abundance and fluctuation of zooplankton of two selected ponds. Uni J. Zool. Rajshahi Univ. 3: 27-34pp.

Haq. S., M.I. 1984. Limnology of a pond with semi-intensive fish culture. An M.Sc. thesis submitted in the Dept. of Zool. Dhaka University. 101pp.

Hasan, M. Ali. 1992. Some aspects of Zooplankton of Dhanmondi Lake, Dhaka with special reference to Rotifera and Copepoda. M.Sc. Thesis, University of Dhaka. 87 pp.

Hasan, M., Ali, M.S. and Naser, M.N. 1994. Study on the Natural productivity of Dhanmondi Lake. Dhaka Univ. J. Biol. Sci 3(1) 59-63pp.

Hashem, M.A., Quddus, M.A. and Khan, M.S. 1997. Studies on growth and mortality of *Cyprinus carpio* Linn. in floating ponds. Bangladesh J. Fish Res. 1 (2)|: 25-30pp.

Hepher, B., and Prugining, Y. 1981. Commercial fish farming with special reference to fish culture in Israil. john. Wiley and Sons, New York. 1X+261pp.

Hora, S.L. and Pillay, T.V.R. 1962, Hand book of fish culture in Indo-Pacific region. FAO fish. Biol. Tech. Paper 14:204pp.

Hossain, M.A, and JAUNCEY, K. 1990. Substitution of fish meal oil seed meals in various combinations in the diet of Common carp *(Cyprinus carpio)* Malay. Appl. Biol. 19 (2): 2-12pp.

Hutchinson, G.E. 1957. A treatise on limnology, vol.1, John Weley and sons, Inc. (New York), Chapman and Hall Ltd. (London) pp.1015pp.

Islam, A.K.M.N., Haroon, A.K.Y. and Zaman, K.M. 1974. Limnological studies of the river Buriganga, Dhaka University Stud. Pt. B. 22(2): 99-111pp.

Islam, A.K.M. and Saha, J.K. 1975. Limnological studies of the Ramna lake at Dhaka Univ. stud. B. 23(2): 39-46pp.

Islam, A.K.M. and Saha, J.K. 1975. Limnological study of the Ramna lake at Dhaka. Univ. Stud. B 23 (2): 39-46pp.

Islam. M.A., Chowdhury, M.Y. and Karim, R. 1978. A comparative study of some physico-chemical factor and the growth of major carps in ponds B.f. Aqua. 1(1): 67-78pp.

Islam, A.K.M.N and Mendes, F. 1976. Limnological studies of a jheel in Sher-Bangla Nagar, Dhaka Univ. Stud, 34(2): 63-71.

Islam, M. 1995. Studies on limnologial parameters of two ponds under polyculture. M.Sc. thesis Dept. of Zool. Dhaka University. 167pp.

ITO, T. 1972. An approach to Nutritional Control Mechanisms in the silkworm *Bombyx mori*. Israil. Journal of Entomology 7: 1-4 pp.

Jauncy, K. and Ross, B. 1982. A guide to *Tilapia* sp. feeds and feeding. Institute of aquaculture. University of Sterling, Scotland. U.K., 111pp.

Jhingran, V,G. 1982. Fish and Fisheries of India (Revised Edition). Published by Hindustan publishing corporation (India), Delhi, India 666pp.

Jhingran, V.G. 1985. Fish and Fisheries of India (Revised-edetion) Published by Hindustan Publishing corporation (India), Delhi, India. 666pp.

Jonasson, P.M. 1961. Population dynamics of *Chironomus anthracinus* zett. In profoundal zone of lake Esrom. Verh. Internet verien. Limnol. 14:196-203pp.

Juday, C. 1922. Quantitative studies of the bottom fauna in the deeper water of the Lake Mendota. Transe. Wis. Acad. Sci. Artsand Left. 20:461-493pp.

Kabir, A.K.M.N., Ali, S., and Khondker, M. 1997. Study on the Zooplankton from Noakhali Northern flood plain. Dhaka Univ. J. Biol. Sci. 6(1): 31-37pp.

Kaliamurthy, M.1975. Observation on the plankton ecology of pulicat lake India S. Fisheries. 22: (1). 87-95pp.

Kalyani, R. and Shetty, H.P.C. 1987. In first Indian fisheries forum. Mangalora. 24 p.

Kamaldeep Kaur, Guspreet, K. and Sehgal, H.S. 1986. Efficacy of biogas slurry in carp, *Cyprinus carpio* (Var.) Communis (Linn.), Culture effect on survival and growth fisheries research complex. Department of Zoology, Punjab Agricultural University, Ludhiana- 141004, Punjab, India. Biological Wastes 22(1987) 139-146pp.

Kanaujia, D. R. 1978. Acceptance of artificial feed by cultivated carps in composite fish culture. J. Inland. Fish. Soc. India, 10: 162-164 pp.

Karim, A. 1969. Distribution and seasonal fluctuation in the abundance of benthos in an artificial pond at Taxas in relation to selected environmental factors. A and M. Univ. U.S.A. 100pp.

Karim, M. 1975. Status and potential of Bangladesh Fisheries pub. By the Ministry of Fisheries and Livestock. 125pp.

Karim, M.A. 1975. An introduction to fish culture in Bangladesh. Zaman Printers, Mymensingh, Bangladesh. 165p.

Karim, M. 1978. Status and potential of Bangladesh Fisheries Pub. by the Min. of Fisheries and Livestock. 125pp.

Kaur, K., Sehgal, G.K and Sehgal, H.S. 1987. Efficiency of biogas slurry in carp, *Cyprinus carpio* (Lim), Culture effects on survival and growth. Fisheries research complex, Dept. Zoology, Punjab Agri. Uni. India-Biological wastes 22 (2). 139-146pp.

Khalaf, A.N. and Mc Donald, L.S. 1975, Physico-chemical condition in temporary ponds in the new forest. India Hydrobiol. 47 (2): 301-318pp.

Khan, S.M.M.H., Aziz, K.M.S., Morshed, M.G. and Shafi, M. 1990. Seasonal Variation in physico-chemical condition Dhanmondi lake water. Bangladesh J. Zool. (18(1):61-66pp.

King, F.S. and Burgess, A. 1992. Nutrition for developing countries. second ed. Elles Oxford Univ. Press. 4-44pp.

Kotani, Y. and Odate, K. 1991. Variations of Zooplankton bio-mass. Qyashio waters Bull. Hokk. Natio. Fish Res. Int. No. 55 (185-195)pp.

Krause, M.V. and Mahan, Y.K. 1998. Food nutrition and diet Therapy. 7th ed. W.B. Saunders Company. U.S.A P. 896-898 pp.

Kravolsov, J.O., Leichter, J.J. and Brooks, D.A. 1984. Planktonic bio-mass study. Proc. Nat Aca. Sci. USSR. 90(5):1986-1690pp.

Krishnamurty, K.P., and Visvesvra, G. 1966. Hydrobiological studies in Gandi sagar (Jumna Tank) seasonal variation of plankton. Hydrobiol. 27:501-514pp.

Krishnamurty, K.N. 1966. Preliminary studies on the bottom macrofauna of the Tungabhadra reservoir. Proc. Indian. Acad. Sci (8) 63(2): 69-103pp.

Lakshminarayan, J.S.S. 1965. Studies on the phytoplankton of the river gangas. Varami, India. Part I and II. Hydrobiology. 25(1-2): 119-137, 138-164pp.

Lakshmanan, M.A.V., Sukumaran, K.K., Murty, D.S., Chakrabarty, D.P. and Philipose, M.T. 1971. Preliminary observation on intensive fish farming in fresh water ponds by the composite culture in India. J. Inland Fish Soc. Indi. 3: 2-21pp.

Latif, G.A., Chowdhury, A. and Sultana, R. 1997. Zonal variation and abundance of benthic macro-invertebrate in relation to some physico-chemical parameters in three ponds at fish-cum-chicken firm. Bangladesh J. Zool. 25(2): 165-171pp.

Lc Mare, D.W. 1948. Weeding in fish farming. Natm. Lond. 162: 704p.

Liener, I.E. 1975. Indigenous toxic factors in oil seed residue, In D. Halliday (ed.) Proc. Cont. Anim. Feed. Trop. Sub-Trop. Origin. Tropical products Institute. London P. 179-188pp.

Leiner, I.E. and Kakade, M.H., Linear, I.E. 1980. Toxic constituents of plant feed stuffs, protease inhibitor. Second edition. Academic Press, Inc. New York. 7-71pp.

Lin, S.Y. 1954, Chinese system of pond stocking. proc. Indo-Pacific Fish. Coun. 5: 113-125pp.

Lind, O.T. 1979. Hand book of common methods in Limnology. The C.V. Mosley Company. St. Louis, London. 199pp.

Macan, T.T. 1963. Fresh water ecology. Longans green. London. 338pp.

Macan, T.T. and Maudslay, R. 1966. The temperature of a mooreland fish pond. Hydrobiol. 27(1and2): 1-22pp.

MAEP. 1997. Project guidline-1997. Mymensingh Aquaculture Extension Project, Mymensingh. 58pp.

Mandal. L.N. (?). Work upon chemistry of pond soils in relation to productivity of fish ponds. Department of Soil Chemistry and Soil Scinence, Bidhan Chandra Krishi Viswavidaylaya, Kalyani, 741235, West Bengal.

Mairs, D.F. 1966. A total alkalinity of a lake water. Limno. Ocenograp. 11:68-7pp.

Mathews, P.M. 1974. Limnology and productivity of Gobindgarth lake. Rewa. Prodesh. J. Inland Fish soc. India. 7: 19-24pp.

Mathews, PM. 1985. Seasonal trends in the fluctuation of Plankton and Physio-chemical factors in a tropical lake (Govindgarh Lake M-P) and their inter-relationship. J. Inland Fish soc. India. 17(1and2): 11-24pp.

Mathius, P.M. 1991. Second friends in the fluctuation of plankton and physico-chemical factors in a tropical lake. (Gobindagrah lake, Maddhya Prodesh, India) and their interrelationships. J. Intt. Fish. Soc. Ind. 27(1-2): 11-24pp.

Markanday, S.A., Mathews, N.F. 1991. Fishes of Indonasia. J.Indos. Fish., 20 (3) 130-133pp.

Markanday, J. and Saran, B.S. 1991. Recycling of cattle shed waste in Aquaculture. Proc. Net. Symp. Freshwater aquaculture 1991: 161-162pp.

Mazid, M.A., Rahman, M.A., Gheyasaddin, S., Hussain, M.A. and Rashid, M.B. 1987. Nutrition requirement of major carp. Optimum level of dietary protein for *Labeo rohita*. Bangladesh J. Fish., 10 (2) 25-33pp.

Mazid, M.A., Pramanik W.A. and Akter, J.N. 1992. Investigation in the nutritional requirement of major carps (*Labeo rohita, Catla catla, Cirrhinus mrigala* and *Labeo calbasu*) Final report. Fisheries Research Institute, Maymensingh.

Mellanby, H. 1963. Animal life in fresh water (A guide of fresh water invertebrates) Chapmon and Hall Ltd. London.

Miah, M.L., Bhyiyan, Islam, N. and Dewan, S. 1981. A comparative study on the growth rate of major carps in relation to physio-chemical and biological factors. Proe. 3rd Nt. Zool. Conl. Bangladesh, Dhaka. 215-224pp.

Miah, M. I., Islam, B.N. and Dewan, S. 1983. Studies on the ecology of two ponds in Bangiadesh. Agriculture University Campus, Mymensingh. Bangla. J. Aq. Cult. (2-5)pp.

Miah, M., Idris, Z.H., Bhuiya and Hashem, M.A. 1985, Phytoplanktons of pond of Bangladesh Agricultural University campus Mymensingh, Bangladesh. J. Agri. 1985, 10(1) 35-42pp.

Michael, R., George (1966). Diurnal variations in physico-chemical factors and Zooplankton in the surface layers of three freshwater fish ponds. Indian J. Fish. 13(1 & 2) 48-82pp.

Michael, R.G. 1968. Studies on the Zooplankton of a tropical pond. Hydrobiol. 32: 47-68pp.

Michael, R.G. 1969. Seasonal trends in physico-chemical factor and plankton of freshwater fish pond and their role in fish culture. Hydrobiol. 33(1):141-159pp.

Michael, C.C. and Smitherman, R.O. 1980. Food habits and growth of Silver carp and Big-head carp in cages and ponds. Aquaculture. 20: 57-64pp.

Mickael, R.G. 1968. Studies on the Zooplankton of a tropical fish pond Hydrobiol. 32: 47-68pp.

Millar, F.W., Rabe. 1969. A limnological comparisons of two small Indo reservoirs Hydrobiol. 33(34): 523-546pp.

Milner, B. A. and Whitteside, P.J. 1981. An Introduction to atomic absorption spectrophotometer, Pye Unicum Ltd. Cambridge, England, z. Px. 75pp.

Moitra, S.K. and Bhattacharya, B.K. 1965. Some hydrological factors affecting plankton production in a fish pond in Kalyani, West Bengal, India. Ichthyologica 4: 8-12pp.

Mollahe, M.F.A. and Haque, A.K.M. 1978. Studies on monthly variation of plankton in relation to the physico-chemical condition of water and bottom soil of two ponds. Bangladesh J. Fish. 1 (2): 99-103pp.

Mondal, B.K. and S.K. Moitra, 1975. Studies on the bottom fauna of a fresh water fish pond at Cuttak. India. Burdwan. J. Inland Fish. Soc., India. 7:43-48pp.

Moore, G.M. 1939. A. Limnological investigation of the microscopic benthic fauna of Doughlas Lake Michigan. Ecol. monog., 9:537-582pp.

Mostafa, A. 1984. Limnology of a village fish pond with semi-intensive fish culture and annual fish production assessment from polyculture in it. M.Sc. Dissertation. Univ. Dhaka. 95pp.

Munwar, M. 1970. Limnological studies on fresh water ponds of Hyderabad, India I. The biotope. Hydrobiol. 35:127-162pp.

Murty, D.S., Saha, G.N., Selvaraj, C., Reddy, P.V.G.K. and Dey, A.K. 1978. Studies on increased fish production in composite fish culture through nitrogenous fertilizer, with and without supplementary feeding. J. Inland Fish. Soc. India. 10: 39-45pp.

Naser, M.N., Shafi, M., Shah, M.S. and Barua, G. 1990. Physico-chemical conditions of two Cat fish rearing ponds at Mymensingh, Bangladesh, J. Asiat. Soc. Bangladesh (Sci.) 16:91-95pp.

Needham, J.G., and Needham, P.R. 1966. A guide to fresh water biology. (5th ed.) Holder-day Inc., Sanfranscisco. 108pp.

Nelson, J.H. and Harp, G.L. 1972. Qualitative lake. The south western naturalist, 17(3) :239 - 248pp.

Nikolasky, G.V. 1963. The ecology of fish. London, Academic Press. 352pp.

Oppenheimer, J.R., Ahmed, M.G., Huf, A., Haque, K.A., Ashraful-Alam, A.K.M. Aziz, K.M.S., Ali, A. and Haque, A.S.M.M. 1978. Limnological studies of three ponds in Dhaka, Bangladesh. Bangladesh J. Fish. 1:1-28pp.

Onuoha, G.C., Chinda, A., Oladosu, G.A., Ayinla, O.A. 1991. Effect of organic fertilizer on pond productivity and water quality of fish ponds at Aluu, Nigeria. Lagos (Nigeria). NIOMR. Dec. 1991. 11p.

Opuszynski, K. 1967. Comparison of temperature and Oxygen tolerance in Grass Carp (*Ctenopharyngodon idella*), Silver carp (*Hypopthalmichthys molitrix*), and Mirror Carp (*Cyprinus carpio*) Eko 1.Pol. (A). 15(17): 385-400pp.

Patnaik, S. 1971. Seasonal abundance and distribution of bottom fauna of chilk lake., J. Marina Bio. Asoc. India. 13(1) 106-125pp.

Pahwa, D.V. and Mehrotra, S.N. 1966. Observations of fluctuations in the abundance of plankton in relation to certain hydrobiological conditions of rivers Ganga. Proc. Nat. Acad. Sce, India. B. 36: 157-189pp.

Patra, R.N.R. and Azadi, M.A. 1987. Ecological studies on the planktonic organisms of the Halda river. Bangladesh. J. Zool. 15(2) 109-123pp.

Patton, M.B., Hitehock, F.A and Haub. J.G. 1941. Inter conversion of food stuffs in the *Blowgly phormia regina.* During metamorphosis II. Change in composition as determined by the oxycalorimete. Ann. Pnt. Soc. Amer. 34: 26-31pp.

Pandian, T.J. and Peter Marian, M. 1990. Utilization of cowdung and poultry manure for mass culture of fish feed organisms *Tubifex* and *Daphnia.* School of Energy, Environment and natural resources, Madurai Kamaraj University, Madurai, 625021, Tamilnadu, India.

Prasad, R.R. 1969. Zooplankton bio-mass in the Arabian sea and the Bay of Bengal with a discussion on the fisheries of the region. Proc. Nat. Sci. India. 35(5): 399-437pp.

Puke, C. 1949. Environmental productivity of lake near Stockholm. Ret. Int. Freshwater. Res. Drottingholm. 29: 81-82pp.

Rabanal, H.R. 1968. Stock manipulation and other biological methods of increasing production of fish through pond fish culture in Asia and the far-east. Proc. Indo-pacific fish. Coun. 4 (1): 171-180pp.

Rahman, H. S., Chowdhury, M.Y., A.K.M. and Haq, M.S. 1982. Limnological studies of four pond. Bangladesh J. Fish. 2.5 (1-2): 25-35pp.

Rahaman, A.K.A. 1989. Freshwater fishes of Bangladesh, zool. soc. Bangladesh. University of Dhaka 364pp.

Rahman, M.S. 1992. Water quality Managent in Aquaculture. BRAC Prokashana, Dhaka, Bangladesh. 83pp.

Raman, K., Ghosh, S.R. & D.K. Chatterjee (1975). Studies on the ecology of fish ponds with special reference to bottom fauna. J. Inland fish. Soc. India, 7: 1973-181pp.

Rai, S.P. 1981. In CIFRI Summer Institute, Barrackpore: 5.

Rao, C.B.1955. On the distribution of algae in a group of a six small ponds. Algal periodicity. J. Ecol. 43:291-308pp.

Ram, N.M., Zur, O. and Avnimelech, Y. 1982. Aquaculture, 27: 63-72pp.

Rathore, D.S. and Kumar, A. 1993. Protein Lipide and carbohydrate content of three micro algae, Phykos-32 (1 and 2): 9-12pp.

Rawsan, D.S. 1952. The bottom fauna of great slave lake. J. Fish Res. Bd. Canada., 10:486-520pp.

Reynolds, C.S. 1984. The ecology of fresh water phytoplankton. Cambridge University press, Cambridge. 384pp.

Rice, C.H. 1983. Studies in the Phytoplankton of the river Thames. Arn. Bot. 2:539-581 pp.

Ried, G.K.1964. Ecology of Inland water and estuaries, Rein. Hold. Publ. corp. New York. pp 373pp.

Roy, H.K. 1955. Plankton ecology of the river Hoogly at Patta, West Bengal ecology. 36:539-581pp.

Roy, P., Singh, S.B. and Sehgal, K.L. 1966. A study of same aspect of ecology of the river Ganga and Jamuna at Alahabad (U.P.) in 1958-59. Proc. Nat. Acad. Sci. India. section. B. 36: 235-272pp.

Roy, T.K. 1983. Limnology of a farmers fish pond and food and feeding habits of *Catla catla* in a semi-intensively managed fish pond at Roypur, Noakhali. M.Sc. thesis submitted in the Dept. of zoology, Dhaka University, 88pp.

Rubbi, S.F., Muslimuddin, M. and Wahed, M.A. 1978. The Present status of fish technology and inspection in Bangladesh. Paper presented to the FAO/DANIDA workshop of fish technology, Colombo, Srilanka.

Ruttner, F. 1975. Fundamentals of Limnology. Torento University Press. Torento. 307pp.

Saha, G.N. & Chatterjee, D.K. 1975. Urea for enhancing the production of zooplankton in fish ponds. Sci. & Cult., 41(7): 320-322pp.

Saha, G.N., Selvaraj, C. and Mazumdar, N.M. 1978. A record of increases fish production in fresh water ponds by the use of fertilizer. Sci. cult. 44 (9): 422-424pp.

Saha, G.N. 1979. Pond fertilization, Madrass J. Fish., 8: 146-150pp.

Sahai, R. and Sinha, A.B. 1969. Investigation of bio-ecology of Inland water Borrakpur (U.P). India hydrobiol. 34: 433-447pp.

Sahai, R. and Sinha, A.B. 1969. Investigation on bio-ecology of inland water of Gorrakhpur (U.P), India, Hydrobiol. 34:433-447pp.

Saigal, B.N. (1972). Domestic sewage in aid of fish culture. Ibid: 79-84pp.

Sehgal, K.L. 1967. Studies on Indian freshwater colonoid Copepoda occuring in fish ponds of Orissa. J. Zool. Soc. India. 19(1 & 2): 53-76pp.

Sen, Rao, N.G.S., Ghosh, S.R. and Rout, M. 1978. Observation on the protin and carbohydrate requirements of carps. Aquaculture 13: 245-255pp.

Shafi, M. and Ouddus, M.M.A. 1982. Bangladesher mathso shampad (Fisheries of Bangladesh) Bangla Academy, Dhaka, 444 pp.

Sharma, B.K. 1981. Fish culture integrated with livestock raising. In seminar on fishery (Inland) as an economic programme for IRD, 28-30 September, 1981, Barrackpore: 15p.

Singa, V.R.P. (1972). Composite fish culture of Indian and exotic carps in India. Souvenir, Silve Jubilee of Indian Independence, Directorate of fisheries, Govt. of West Bengal: 5-9pp.

Sing, R. and Singh, R.P. 1992. Effects of different levels of protein on the absorption efficiency in Siluroid Cat fish *(Clarias batrachus)*. J. Aquaculture. Bamidgeh, India. 44 (1): 3-6pp.

Singh, S.B., Banerjee, S.C. and Chakrabarti, P.E. 1967. Preliminary observation on response of young Chinese carps to various physico-chemical factors of water. Proc. Net. Acad. Sci. India (Biol. Sci.) 37 (3): 320-324pp.

Singh, S.B., Sukumaran, K.K., Chakrabarti, P.C. and Begchi, M.M. (1972). Observation on composite culture of exotic carps. Ibid, 4: 38-50pp.

Singh, B.N., Sinha, V.R.P. and Chkraborty, D.P. 1978. Effect of protein quality and temperature on the growth of fingerlings of Rohu *(Labeo rohita)*. Paper presented at world symposium on fin fish nutrition and fish feed technology. Hamberg (FAG), 20 JUNE. 1978

Sinha, V.R.P., Gupta, M.V., Banergee, M.K. and Kumar, D. 1973. Composite fish culture at Kalyani, West Bangle. J. Inland fish. Soc. India. 5: 201- 207pp.

Sinha, V.R.P., Vijaya Gupta, M., Banerjee, M.K. and Dhirendra Kumar. 1973. Composite fish culture at Kalyani, West Bangle. J. Inland fish. Soc. India. 5: 67-78pp.

Sinha, M. and Saha, P.K. 1980. Efficacy of a commercial fish feed for composite fish culture. J. Inland fish society, India, 12(2): 51-55pp.

Sitaramiah, P.1966. Studies on the ecology of fresh water pond community. Hydrobiol 27: 524-597pp.

Smith, E.V. and Swingle, H.S. 1942. Organic materials and fertilizers for fish ponds. Trans. Amer. Fish. Soc. 72: 97-102pp.

Soeder, C.J. 1980. Massive cultivation of micro algae, Result and Prospects Hydrobiology. 72:197-209.

Srivastuva, V.K. 1959. Studies on fresh water bottom fauna and qualitative composition and variation of available food supply for fish. Psoc. Nat. Acad. Sci. India, 29: 207-216pp.

Srivastava, S.P., Joshi, H.E. and Karamchandani, S.J. 1979. Observation on volumetric estimation of plankton biomass in relation to certain hydrobiological condition of govindgarh lake, rewa (M.P) J. Inland fish. soc., India, 11:113-116pp.

Sukumaran, K.K., Singh, S.B., Murty, D.S. and Chakrabarty, P.C. 1968. Studies on compatibility and competition between Silver carp, Catla. Proc. Indo Pacific Fish. Coun. 13(11):185-194pp.

Sukumaran, K.K. 1976. Progress report of the karnal sub-center of Haryana. In Third workshop on the all India co-ordinate research project on composite fish culture and fish seed production,. CIFRI. Peri. India.

Swale, E. M. F. 1964. A study of the phytoplankton of a calcareous river. J. Ecol. 52(2): 433-446pp.

Sugunan, V.V. 1980. Seasonal fluctuations of planktons of nagarjunsagar reservior. A.P. India. J. Inland fish Soc. India. Vol. 12. No. 1, June 1980. 79-93pp.

Swingle, H.S. 1996. Standardization of chemical analysis for water and pond muds, FAO fish. Rep. 4(44): 397-421pp.

Tonapi, G.T. 1980. Fresh water animal in India (An ecological Approach). Oxford and IBH publishing Co. New Delhi, 341pp.

Tripathi, S. D. 1988.. Recent advances in fresh water aquaculture. Nat. Symp. Aquac. Univ. Kalyani. India. 1-66pp.

Tripathi, S.D., Aravindakshan, P.K., Ayyappan, S., Ranjit Singh, A.N., Mohanly and Muduli, H.K. 1989. In. Natl. Sim. on Freshwater aquaculture in India, Bhubannswar; No. SIV/I.

Tripathi, S.D., Sandha Bhandari, Madumita Das and Ayyappan, S. 1991. Evaluations of manurial application levels of biogas slurry in carp farming. Proc. Nat. Symp. Freshwater Aqua. 1991. 157-160pp.

Thinmann, L. 1978. Studies on the ecology of fresh water pond community. Hydrobiol. 35: 610-627pp.

Vaas, K.F. and Sachlan, M. 1955. Limnological studies on diuernal fluctuations in shallow ponds in Indonesia. Verh. Int. Ver. Limnol. 12: 309-319pp.

Verma, M.N. 1969 Hydrobiological study of a tropical impoundment, Tekunpur reservoirs, Gwalior, India, with special reference. Hydrobiol. 34.(3-4):358-368pp.

Vyas, L.N. and Kumar, H.D. 1968. Studies in the phytoplankton and other algae of indrasager tank, udaipur, India, Hydrobiol. 31; 421-434pp.

Ward, H.B. and Whipple, G.C. 1959. Fresh water Biology (seconded.), edited by Edmondson, W. T. John Wiley and sons. New York, U.S.A. 538pp.

Wahab, M.A., Begum, M. and Ahmed, Z.F. 1991. The effects of Silver carp introduction in the polyculture of major Indian carp. Proc. BAU. res. Pros. 5: 429-437pp.

Wahab, M. A. 1996. Towards sustainable Management, status and potentialities of Bangladesh fisheries. Consultant, National Conservation strategies Implementation Project. 1. Ministry of Environment and forest. 43pp.

Welch. P.S. 1952. Limnology (second ed.) Mc. Graw-Hill Company New York pp 538pp.

Wheebs, E.L. and Ferrel, R.E. 1971. A Methods for Phytic Acid Determination in wheat and wheat Fraction, Cereal Chemistry. Vol. 48: p. 312-320pp.

Wohlfarth, G.W. and Hulata, G 1987. In detritus and microbial ecology in aquaculture, ICLARN, Philippines: 353-367pp.

Wohlfarth and Hulata. 1987. Studies on the fishery resource of China, Hydrobiol. 37: 324-356pp.

Wong, N.H., Chiu, S.T. 1993. Feasibility studies on the use of sewage sludge as supplementary feed for rearing *Tilapia.* Environmental technology (U.K.) 1993. V. 14(12): 1152-1161pp.

Wunder, W. 1949. Progressive pond culture of carp: E. Schweitzerbart'sche Verlagshuch-handlung, Erwin Najele, Stuttgart. 386 p.

Zaher, M. 1987. Species combination and stocking density in pond fish culture Bangladesh. J. Agri. Sei, 17 (2): 317-322pp.

Zaman, L., Khandker, M. and Nabi, M. R. 1993. A comparative limnology of three ponds in Jhangirnagar University Campus: Physical and Chemical aspects. Bangladesh. J. Bot. 22(1): 81-87pp.

Zaman. L., Khandker, M. and Nabi, M.R. 1994. Composition and diversity index of Plankton in three ponds of Jahangirnagar University Campus. Bangladesh J. Bot 23 (1) :33-39pp.

Zhang, F.L., Zhu, Y. and Zhou, X.Y. 1987. Studies on the ecological effects on varying the size of fishponds loaded with manure and feeds, Aquaculture. 60:107-116pp.

8.0. Table contents

Table: 1.a

Minimum & maximum Rainfall in two years study period.

Year	Minimum (mm)	Month	Maximum (mm)	Month
First year	Zero	December'98	370	July'98
Second year	5 mm	January, 2000	380	September'99

Table:1.b

Minimum & maximum Hour of sunshine in two years study period.

Year	Minimum in hour	Month	Maximum in hour	Month
First year	4	August'98	8.9	February'99
Second year	5	June'98	8.2	February, 2000

Table: 1.c

Minimum & maximum Humidity in two years study period.

Year	Minimum (%)	Month	Maximum (%)	Month
First year	64	February'99	83	August'98
Second year	60	March, 2000	85	September'99

Table:1.d

Minimum & maximum water depth of different pond in two years study period.

Pond	Pond-1		Pond -2		Pond -3		Pond -4		Pond -5		Pond -6		Pond -7	
Year	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
First year	160 May' 98	192 Oct' 98	161 Ma' 98	192 Sep' 98	155 Ma' 98	192 Sep' 98	160 Ma' 98	190 Sep' 98	155 Ma' 98	192 Oct' 98	157 Ma' 98	194 Sep' 98	155 Ma' 98	186 Sept' 98
Seco nd year	170 June' 99	208 Sept' 99	172 June' 99	201 Sept' 99	158 May' 99	193 Sept' 99	155 May' 99	187 Sept' 99	160 May' 99	190 Oct' 99	159 May' 99	188 Oct' 99	160 May' 99	192 Sept' 99

Table: 1.e
Minimum & maximum Water transparency of different ponds in two years study period.

Pond	Pond-1		Pond -2		Pond -3		Pond -4		Pond -5		Pond -6		Pond -7	
Year	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
First year	28.6 Jan' 99	34 June' 98	28.7 Jan' 99	34 June' 98	28.8 Jan' 99	34.5 June' 98	29 Jan' 99	33.5 June '98	28.7 Jan' 99	34.7 June '98	28.15 Jan' 99	34.5 June' 98	30.3 Feb' 98	35.5 June' 98
Second year	28.9 Jan' 2000	32.9 July' 99	30 Apr' 99	39.6 Jan' 2000	29.6 Jan' 2000	35.7 June' 99	30.5 Jan' 2000	35.9 June '99	30.7 Jan' 2000	34.2 June '99	30.4 Jan' 2000	34 June' 99	30.6 5 Feb' 200 0	35 Nov' 99

Table: 1.f
Minimum & maximum Air temperature in two years study period.

Pond	Pond-1		Pond -2		Pond -3		Pond -4		Pond -5		Pond -6		Pond -7	
Year	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
First year	22.3 Dec' 98	32.3 Apr' 98	22.3 Dec' 98	32.2 Apr' 98	22.7 Dec' 98	32 Apr' 98	22.4 Dec' 98	32.2 Apr' 98	22.5 Dec' 98	32.1 Apr' 98	22.5 Dec' 98	32.1 Apr' 98	22 Dec' 98	32.8 Apr' 98
Second year	21.9 Dec' 99	33.3 July' 99	21.9 Dec' 99	33.4 July' 99	22 Dec' 99	33.4 July' 99	21.9 Dec' 99	33.3 July' 99	21.2 Dec' 99	32.8 Jun' 99	21.1 Dec' 99	32.7 Jun' 99	21.5 Dec' 99	33.3 Jun' 99

Table: 1.g
Minimum & maximum Water temperature of different ponds in two years study period.

Pond	Pond-1		Pond -2		Pond -3		Pond -4		Pond -5		Pond -6		Pond –7	
Year	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
First year	23.5 Dec' 98	33.2 July' 98	23.5 Dec' 98	33.1 July '98	23.5 Dec' 98	33.4 Apr' 98	23.4 Dec' 98	33.4 Apr' 98	23.9 Dec' 98	33.3 Apr' 98	23.4 Dec' 98	33.2 Apr' 98	22.5 Dec' 98	33.2 July' 98
Second year	23.1 Dec' 99	33.5 June' 99	23 Dec' 99	33.5 Apr' 99	23.5 Dec' 99	33.5 July' 99	23.1 Dec' 99	33.5 July' 99	22.4 Dec' 99	32.9 July' 99	22.4 Dec' 99	32.9 July' 99	23.1 Dec' 99	33.5 July' 99

Table: 1.h
Minimum & maximum P^H of different pond water in two years study period.

Pond	Pond-1		Pond –2		Pond -3		Pond -4		Pond –5		Pond -6		Pond –7	
Year	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
First year	6.5 Nov' 98	7.2 Sept' 98	6.8 May' 98	7.4 Oct' 98	6.5 Oct' 98	8.3 Mar '99	6.3 Oct' 98	8.4 Mar '99	6.3 May' 98	7.3 Aug' 98	6.4 May' 98	7.3 Dec' 98	6.8 Apr' 98	7.5 July '98
Second year	6.8 Dec' 99	7.9 Sept' 99	6.5 Jan'2000	7.5 Oct' 99	6.8 Aug' 99	7.7 Mar '2000	6.8 Nov' 99	7.3 Jan' 2000	6.4 Feb' 2000	7.4 July' 99	6.6 Jan' 2000	7.3 July' 99	6.8 Oct' 99	7.3 July '99

Table: 1.i
Minimum & maximum Carbon dioxide (CO_2) of different ponds water in two years study period.

Pond	Pond-1		Pond -2		Pond –3		Pond -4		Pond -5		Pond -6		Pond -7	
Year	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
First year	11 Jan' 99	12.1 Aug' 98	11.1 Apr' 98	12.5 Dec' 98	6 July' 98	13.2 Oct' 98	5 Oct' 98	8.4 May' 98	10.2 Jan' 99	12.8 Nov' 98	10 Apr' 98	13 July' 98	8 May' 98	9.2 Jan' 99
Second year	10.9 May' 99	12.7 Nov' 99	10.9 Apr' 99	12.4 Mar' 2000	5.3 Feb' 2000	9.3 May' 99	7.4 July' 99	8.3 Sept' 99	10.1 Sept' 99	12.3 Oct' 99	10.5 Mar' 2000	11.9 Oct'99	7.6 July' 99	8.3 Apr' 99

Table: 1.j
Minimum & maximum Dissolved oxygen DO of different ponds water in two years study period.

Pond	Pond-1		Pond -2		Pond -3		Pond -4		Pond -5		Pond -6		Pond -7	
Year	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
First year	6.5 July' 98	7.5 Oct' 98	6.8 Sept' 98	7.2 Apr' 98	6.5 Oct' 98	12 Mar' 99	7.2 Sept' 98	9.6 Mar' 99	6.9 Mar' 99	8.8 Sept' 98	7 Mar' 99	8.9 June' 98	8.1 Aug' 98	9.1 Apr' 98
Second year	7.2 Mar' 2000	8.2 Sept' 99	6.9 Jan' 2000	7.8 Aug' 99	7 Oct' 99	10.3 Mar' 2000	7.8 Oct' 99	9.2 Apr' 99	7.3 Mar' 2000	8.9 Sept' 99	7.8 Nov' 99	8.6 Aug' 99	7.7 Oct' 99	9.2 Apr' 99

Table: 1.k
Minimum & maximum Hardness of different ponds water in two years study period.

Pond	Pond-1		Pond -2		Pond -3		Pond -4		Pond -5		Pond –6		Pond -7	
Year	Min. mg/l	Max. mg/l	Min. mg/l	Max. mg/l	Min. mg/l	Max. mg/l	Min. mg/l	Max. mg/l	Min. mg/l	Max. mg/l	Min. mg/l	Max. mg/l	Min. mg/l	Max. mg/l
First year	95.9 Jan' 99	109 Aug' 98	100 Apr' 98	118 Oct' 98	92 Jun' 98	120 Jan' 99	92.8 Jun' 98	118 Feb' 99	99 Dec' 98	114 Oct' 98	98 Feb' 99	115 Oct' 98	96.7 Nov' 98	102 Mar' 99
Second year	117 Dec' 99	135 Aug' 99	103 Dec' 99	123 Sept' 99	95.9 July' 99	111.5 Jan' 200 0	95 Jun' 99	107 Oct'9 9	100 Dec' 99	114 Apr' 99	101 May' 99	117 Oct' 99	99 Apr' 99	110 Oct' 99

Table: 1.l
Minimum & maximum Alkalinity of different ponds water in two years study period.

Pond	Pond-1		Pond -2		Pond -3		Pond -4		Pond -5		Pond -6		Pond -7	
Year	Min. ppm	Max. ppm	Min. ppm	Max. ppm	Min. ppm	Max. ppm	Min. ppm	Max. ppm	Min. ppm	Max. ppm	Min. ppm	Max. ppm	Min. ppm	Max. ppm
First year	80 Apr' 98	91 Nov' 98	84 May' 98	94 Dec' 98	50 May' 98	120 Jul' 98	50 Jun' 98	111 Aug' 98	81 Dec' 98	90 Feb' 99	81 June' 98	91 Feb' 99	80 Apr' 98	94 Nov' 98
Second year	78 Mar' 2000	97 Oct' 99	81 Sept' 99	92 Feb' 2000	61 May' 99	118 Sept' 99	70 Jun' 99	91 Nov' 99	81 Dec' 99	91 Mar' 2000	80 May' 99	89 Sep' 99	76 Jan' 2000	85 Aug' 99

Table: 1.m
Phytoplankton abundance in two years study period.

Sample	Pond	First Year April'98-March'99				Second Year April'99-March'2000			
		Min (indv/l)	Month	Max (indv/l)	Month	Min (indv/l)	Month	Max (indv/l)	Month
Sample-1	Pond-1	17301	Oct.'98	40503	July'98	14044	Oct'99	32530	July'99
	Pond-2	13119	March' 99	29433	July'98	11310	Nov.'99	26130	July'99
Sample-2	Pond-3	26100	Oct.'98	73745	July'98	29438	Oct.'99	67830	July'99
	Pond-4	22733	Oct.'98	70230	July'98	5113	Jan.'2000	7177	April'99
Sample-3	Pond-5	24520	Oct.'98	70380	July'98	21532	Oct.'99	68210	July'99
	Pond-6	20311	Oct.'98	65708	July'98	18232	Oct.'99	67103	July'99
Sample-4	Pond-7	21181	Oct.'98	66018	July'98	25896	Oct.'99	64337	July'99

Table: 1.n
Average number of Phytoplankton of different ponds during the study period.

Pond	Pond-1		Pond -2		Pond -3		Pond -4		Pond -5		Pond -6		Pond –7	
1st	1st Yr	2nd Yr	1st Yr	2nd Yr	1st Yr	2nd Yr	1st Yr	2nd Yr	1st Yr	2nd Yr	1st Yr	2nd Yr	1st Yr	2nd Yr
Chlorophyceae	10679	8705	9113	6387	22810	22098	18961	14221	21197	17789	16057	12927	14953	15842
Cyanophyceae	6488	5065	4581	4481	10568	11367	10550	7896	9612	8954	10304	11128	12575	13502
Euglenophyceae	2670	2484	1875	2501	5845	4382	5464	4080	6437	5723	6450	7496	5793	6577
Bacillariophyceae	5163	4032	3694	4104	5845	9181	8085	7473	7221	6915	8139	8972	9934	10964

Table: 1.o
Minimum and maximum population abundance of Zooplankton in two years study period.

Sample	Pond	1ar year April'98-March'99				2nd Year Aril'99-March'2000			
		Min. (indv./l)	Month	Max. (indv /l)	Month	Min. (indv. /l)	Month	Max. (indv /l)	Month
Sample-1	Pond-1	9030	April'98	11908	June'98	8056	April'99	10780	May'99
	Pond-2	8800	April'98	11781	Aug.'98	7189	April'99	10715	Aug'99
Sample-2	Pond-3	14218	Feb'99	24323	June'98	14001	Mar'2000	23908	Nov.'99
	Pond-4	11787	Oct.'98	21507	June'98	9804	Aug.'99	19711	June'99
Sample-3	Pond-5	10444	Sept'98	19860	June'98	11581	Sept.'99	21856	May'99
	Pond-6	8110	Sept'98	16911	June'98	10799	Sept.'99	19018	June'99
Sample-4	Pond-7	10011	Aug.'98	20132	May;98	11577	Aug.'99	23370	June'99

Table: 1.p
Average number of Zooplankton in different ponds during the study period.

Pond	Pond-1		Pond -2		Pond -3		Pond -4		Pond -5		Pond -6		Pond -7	
	1st Yr	2nd Yr	1st Yr	2nd Yr	1st Yr	2nd Yr	1st Yr	2nd Yr	1st Yr	2nd Yr	1st Yr	2nd Yr	1st Yr	2nd Yr
Rotifea	2615	2221	1825	1693	5209	4788	3686	3822	4675	3985	3525	3963	3379	4173
Cladocera	1975	1554	1977	1713	3230	3348	2553	2588	2739	3089	2405	2714	2865	3038
Copepoda	2062	1612	2023	1686	3434	3380	3139	3406	2765	3166	2345	2204	3623	3915
Ostracoda	1213	1121	1249	1060	1264	1397	1373	2002	1165	1564	983	1452	2175	2809
Nauplius	1349	1371	1309	1237	1527	1694	1695	2041	1390	2012	1169	1848	2213	2677
Protozoa	1280	1624	1926	1844	3249	2777	2564	2347	2761	3258	2106	2106	2659	2856
Avg.	10494	9503	10319	9233	17913	20384	15010	15495	15495	17074	12533	14287	16914	19468

Table: 1.q
Minimum and maximum population abundance of Benthos in two years study period.

Sample	Pond	1ar year April'98-March'99				2nd Year Aril'99-March'2000			
		Min. (indv./m²)	Month	Max. (indv./m²)	Month	Min. (indv./m²)	Month	Max. (indv./m²)	Month
Sample-1	Pond-1	2119	Dec.'98	3018	April'98	1804	Dec.'99	2730	June'99
	Pond-2	2117	July'98	2817	April'98	2271	June'99	3179	Sept.'99
Sample-2	Pond-3	2039	Aug.'98	6887	Feb.'99	2056	Oct.'99	7561	Feb.'2000
	Pond-4	1813	Aug.'98	6317	April'98	2718	Aug.'99	7177	April'99
Sample-3	Pond-5	2038	Aug.'98	5833	Feb.'98	1918	Aug.'99	5353	Dec.'99
	Pond-6	1834	Aug.'98	4885	April'98	1877	Oct.'99	5118	April'99
Sample-4	Pond-7	2928	Aug.'98	7970	April'98	4118	July'99	9008	April'99

Table: 1.r
Average number of Benthos of different pond during the study period.

	Pond-1		Pond -2		Pond -3		Pond -4		Pond -5		Pond -6		Pond -7	
	1st Yr	2nd Yr	1st Yr	2nd Yr	1st Yr	2nd Yr	1st Yr	2nd Yr	1st Yr	2nd Yr	1st Yr	2nd Yr	1st Yr	2nd Yr
Oligochaeta	1235	1048	947	1076	3059	2889	2521	2741	2188	1685	1767	1559	2942	2704
Chironomid	972	885	912	950	1575	1875	1672	1638	1368	1539	1369	1513	1748	1983
Mollusca	295	342	305	345	487	604	461	605	510	547	509	602	680	1128

Tabel: 1.s
Proximate composition of different feed sample.

Sample	Moisture	Ash mg/100g	Crude Fibre mg/100g	Protein Content mg/100g	Fat Content mg/100g	Carbohydrate mg/100g	Caloric Content mg/100g
Sample-1	00	15.30	4.58	18.15	5.87	42.27	350
Sample-2	00	36.09	11.28	19.15	7.84	47.44	218
Sample-3	00	11.04	5.40	28.12	9.30	51.32	420
Sample-4	00	17.54	4.80	29.73	8.45	68.16	347

Table: 1.t

Estimation of mineral contents of different feed sample.

SAMPLE	Ca^{+} mg/100g	Mg^{+} mg/100g	Zn^{+} mg/100g	Cu^{+} mg/100g	Fe^{+} mg/100g
Sample-1	718	672	11.64	2.04	21.68
Sample-2	323	296	5.72	1.08	8.57
Sample-3	307	253	5.37	.92	9.92
Sample-4	492	417	2.94	.85	14.82

Table: 1.u
Area of different ponds under study

No.	Name	Length (m)	Width (m)	Depth (m)	Area/ha
1	Pond-1	70	58	2.66	0.34
2	Pond-2	70.66	60	2.5	0.35
3	Pond-3	71.66	61.66	2.33	0.36
4	Pond-4	73.33	63.33	2.33	0.38
5	Pond-5	73.33	63.33	2.83	0.38
6	Pond-6	77.33	62.33	2.66	0.37
7	Pond-7	70	58.33	2.66	0.34

Table-1.v
Monthly fluctuation of Water colour of the studied ponds of the year 1998-1999.

Pond	April'98	May'98	June'98	July'98	August'98	September'98	October'98	November'98	December'98	January'99	February'99	March'99
Pond-1	Green	Green	Green	Green	Green	Green	Light Green	Green	Green	Green	Light Green	Light Green
Pond-2	Green	Green	Green	Green	Green	Green	Light Green	Green	Green	Green	Light Green	Light Green
Pond-3	Green	Green	Green	Green	Green	Green	Light Green	Green	Green	Green	Light Green	Light Green
Pond-4	Green	Green	Green	Green	Green	Green	Light Green	Green	Green	Green	Light Green	Light Green
Pond-5	Green	Green	Green	Green	Green	Green	Light Green	Green	Green	Green	Light Green	Light Green
Pond-6	Green	Green	Green	Green	Green	Green	Light Green	Green	Green	Green	Light Green	Light Green
Pond-7	Green	Green	Green	Green	Green	Green	Light Green	Green	Green	Green	Light Green	Light Green

Table-2
Monthly fluctuation of Water colour of the studied ponds of the year 1999-2000.

Pond	April'99	May'99	June'99	July'99	August'99	September'99	October'99	November'99	December'99	January'2000	February'2000	March'2000
Pond-1	Green	Green	Green	Green	Green	Light Green	Light Green	Green	Green	Green	Light Green	Light Green
Pond-2	Green	Green	Green	Green	Green	Light Green	Light Green	Green	Green	Green	Light Green	Light Green
Pond-3	Green	Green	Green	Green	Green	Light Green	Light Green	Green	Green	Green	Light Green	Light Green
Pond-4	Green	Green	Green	Green	Green	Light Green	Light Green	Green	Green	Green	Light Green	Light Green
Pond-5	Green	Green	Green	Green	Green	Light Green	Light Green	Green	Green	Green	Light Green	Light Green
Pond-6	Green	Green	Green	Green	Green	Light Green	Light Green	Green	Green	Green	Light Green	Light Green
Pond-7	Green	Green	Green	Green	Green	Light Green	Light Green	Green	Green	Green	Light Green	Light Green

Table-3
Monthly fluctuations of Rainfall of the studied area during the study period.

Year	April (mm)	May (mm)	June (mm)	July (mm)	August (mm)	September (mm)	October (mm)	November (mm)	December (mm)	January (mm)	February (mm)	March (mm)
1998-1999	160	210	340	370	200	350	320	130	—	—	67	30
1999-2000	111	166	205	208	257	380	328	203	18	5	21	57

Table-4
Monthly fluctuation of Sun-shine of the studied area during the study period.

Year	April (hour)	May (hour)	June (hour)	July (hour)	August (hour)	September (hour)	October (hour)	November (hour)	December (hour)	January (hour)	February (hour)	March (hour)
1998-1999	7.2	7.4	5.2	4.1	4	5.2	7.9	8.2	6.9	7.5	8.9	8.3
1999-2000	7	7.1	5	3.1	3.5	5.5	7.3	7.9	6.1	7.8	8.2	8.5

Table-5
Monthly fluctuation of Humidity of the studied area during the study period.

Year	April (%)	May (%)	June (%)	July (%)	August (%)	September (%)	October (%)	November (%)	December (%)	January (%)	February (%)	March (%)
1998-1999	73	79	78	73	83	80	78	76	72	70	64	66
1999-2000	62	64	71	70	73	85	76	69	68	69	62	60

Table-6
Monthly fluctuation of Water depth of studied ponds in 1998-1999.

Pond	April'98 (cm)	May'98 (cm)	June'98 (cm)	July'98 (cm)	August'98 (cm)	September'98 (cm)	October'98 (cm)	November'98 (cm)	December'98 (cm)	January'99 (cm)	February'99 (cm)	March'99 (cm)
Pond-1	170	160	171	175	183	193	192	191	188	178	176	172
Pond-2	171	161	170	176	182	192	191	190	186	179	177	171
Pond-3	160	155	161	165	188	192	190	181	172	168	162	158
Pond-4	166	160	163	169	178	190	188	184	174	170	166	161
Pond-5	167	155	170	174	179	190	192	190	185	177	175	171
Pond-6	170	157	171	176	181	194	193	193	188	179	176	173
Pond-7	161	155	167	165	181	186	184	180	176	176	170	165

Table-7
Monthly fluctuation of water depth of the studied ponds in 1999-2000.

Pond	April'99 (cm)	May'99 (cm)	June'99 (cm)	July'99 (cm)	August'99 (cm)	September'99 (cm)	October'99 (cm)	November'99 (cm)	December'99 (cm)	January'2000 (cm)	February'2000 (cm)	March'2000 (cm)
Pond-1	174	173	170	187	194	208	197	192	188	185	184	180
Pond-2	180	174	172	189	194	201	197	186	185	183	183	181
Pond-3	166	158	170	171	185	193	190	187	185	176	170	168
Pond-4	160	155	166	168	180	187	185	178	180	170	165	162
Pond-5	170	160	172	177	180	188	190	187	184	180	178	176
Pond-6	168	159	171	173	180	185	188	185	183	178	177	174
Pond-7	166	160	172	174	186	192	191	184	186	176	172	168

Table-8
Monthly fluctuation of Secchi-disc visibility of the studied ponds in 1998-1999.

Pond	April'98 (cm)	May'98 (cm)	June'98 (cm)	July'98 (cm)	August'98 (cm)	September'98 (cm)	October'98 (cm)	November'98 (cm)	December'98 (cm)	January'99 (cm)	February'99 (cm)	March'99 (cm)
Pond-1	29.5	32.4	34	32.9	32.15	31.15	32	33.6	31.6	28.6	31.6	32.4
Pond-2	29.5	32.4	34.0	32.95	32.25	31.3	32	33.6	31.6	28.7	31	32.4
Pond-3	30.4	32.9	34.5	32.5	32	32	32.5	33.5	31.5	28.8	32	32.6
Pond-4	30.5	32.5	33.5	32.3	31.9	32	32.6	33.6	31.8	29	31.7	32.4
Pond-5	30.4	32.8	34.7	33.10	32.3	31.9	32.6	33.7	31.7	28.7	31.8	32.5
Pond-6	29.9	32.5	34.5	32.8	31.9	33.9	33.4	33	30.9	28.15	31.15	32.4
Pond-7	30.9	32.65	35.5	33	32.8	31.9	32.75	32.2	30.9	31.3	30.3	32.6

Table-9
Monthly fluctuation of Secchi-disc visibility of the studied ponds in 1999-2000.

Pond	April'99 (cm)	May'99 (cm)	June'99 (cm)	July'99 (cm)	August'99 (cm)	September'99 (cm)	October'99 (cm)	November'99 (cm)	December'99 (cm)	January'2000 (cm)	February'2000 (cm)	March'2000 (cm)
Pond-1	29.7	32.15	33.7	32.9	32.1	31.1	31.9	33.1	31.5	28.9	31.05	32.05
Pond-2	30	32.3	33.4	32.8	32.2	30.6	33.5	32.5	30	39.6	30.6	32.15
Pond-3	30.5	32.8	35.7	32.3	32.3	32.25	32.15	33.8	31.5	29.6	31.2	32.0
Pond-4	30.6	32.6	35.9	33.1	32.7	30.9	32	32	30.5	30.5	30.5	31.7
Pond-5	31	32.6	34.2	33.7	33.6	32.5	34.2	34.0	33.10	30.7	31.7	32.50
Pond-6	30.8	32.6	34	33.6	33.5	32.35	34.1	33.8	32.9	30.4	31.4	32.40
Pond-7	31.5	32.5	33.75	32.05	32.75	33.60	34.15	35.05	34.05	33.70	30.65	30.60

Table-10
Monthly fluctuation of Air temperature in the studied area during 1998-1999.

Pond	April'98 (°C)	May'98 (°C)	June'98 (°C)	July'98 (°C)	August'98 (°C)	September'98 (°C)	October'98 (°C)	November'98 (°C)	December'98 (°C)	January'99 (°C)	February'99 (°C)	March'99 (°C)
Pond-1	32.3	31	30.4	31	30.4	29	28	25.4	22.3	24	29.4	30.2
Pond-2	32.2	31	30.4	31	30.4	29	28	25.4	22.3	24	29.4	30.2
Pond-3	32	30.5	30	31.5	30.5	29	28	25.5	22.7	24	29.5	30
Pond-4	32.2	30.5	30.1	31.4	30.4	29	28	25.4	22.4	24	29.4	30
Pond-5	32.1	30.4	30	31.4	30.5	29	28	25.5	22.5	24	29.5	30
Pond-6	32.1	30.4	30	31.4	30.5	29	28	25.5	22.5	24	29.5	30
Pond-7	32.8	32.6	32.4	33.1	32	30	31	28.2	22	23	28	31

Table-11
Monthly fluctuation of Air temperature in the studied area during 1999-2000.

Pond	April'99 (°C)	May'99 (°C)	June'99 (°C)	July'99 (°C)	August'99 (°C)	September'99 (°C)	October'99 (°C)	November'99 (°C)	December'99 (°C)	January, 2000 (°C)	February, 2000 (°C)	March, 2000 (°C)
Pond-1	33	32.6	32.7	33.3	32	30	31	28	21.9	23.4	30	31
Pond-2	33	32.6	32.7	33.4	32.2	30.1	31.2	28.3	21.9	23.4	29	31
Pond-3	33.1	32.7	33	33.4	32.2	30	31	28	22	23	29.5	31
Pond-4	33	32.7	32.8	33.3	32.1	30	31.1	28.1	21.9	23.3	29.1	31.2
Pond-5	32.6	31.8	30.8	32.8	31.2	30.5	28.2	26.6	21.2	23.1	26.4	30.2
Pond-6	32.4	31.7	30.7	32.7	31.2	30.5	28.2	26.4	21.1	23.1	26.3	30.2
Pond-7	33	32.7	32.8	33.3	32.1	30	31.1	28.1	21.9	23.3	29.1	31.2

Table-12
Monthly fluctuation of Water temperature in the studied area during 1998-1999.

Pond	April'98 (°C)	May'98 (°C)	June'98 (°C)	July'98 (°C)	August'98 (°C)	September'98 (°C)	October'98 (°C)	November'98 (°C)	December'98 (°C)	January'99 (°C)	February'99 (°C)	March'99 (°C)
Pond-1	33.1	32.2	31.6	33.2	31.8	31.6	29.6	26.4	23.5	25.8	30.6	30.9
Pond-2	33	32.1	31.4	33.1	31.6	31.5	29.6	26.4	23.5	25.7	30.5	30.8
Pond-3	33.4	32	31.7	33	31.8	31.5	29.5	26.3	23.5	25.7	30.5	30.7
Pond-4	33.4	32	31.7	33	31.6	31.5	29.4	26.3	23.4	25.6	30.4	30.6
Pond-5	33.3	32.1	31.7	33.1	31.7	31.5	29.5	26.3	23.4	25.7	30.4	30.7
Pond-6	33.2	32.1	31.6	33	31.6	31.4	29.4	26.2	23.4	25.6	30.3	30.6
Pond-7	33	32.8	32.5	33.2	32.2	30.2	31.1	28.3	22.9	23.5	28.4	31.2

Table-13
Monthly fluctuation of Water temperature in the studied area during 1999-2000.

Pond	April'99 (°C)	May'99 (°C)	June'99 (°C)	July'99 (°C)	August'99 (°C)	September'99 (°C)	October'99 (°C)	November'99 (°C)	December'99 (°C)	January'2000 (°C)	February'2000 (°C)	March'2000 (°C)
Pond-1	33.3	32.8	33.5	33.2	32.3	30.3	31.1	28.5	23.1	23.7	29.4	31.3
Pond-2	33.5	32.7	33	33.4	32.3	32.---	31.1	28.7	23	23.6	29.--	31.2
Pond-3	33.3	33	33.2	33.5	32.4	30.4	30.8	28.8	23.5	23.8	29.9	31.2
Pond-4	33.4	32.9	33.1	33.5	32.4	30.3	31.2	28.6	23.1	23.8	29.5	31.4
Pond-5	32.8	32	31.4	32.9	31.8	31.3	29.2	26.3	22.4	22.6	25.9	31.2
Pond-6	32.6	32	31.3	32.9	31.8	31.3	29.1	26.3	22.4	22.6	25.8	31.1
Pond-7	33.4	32.9	33.1	33.5	32.4	30.4	31.2	28.6	23.1	23.8	29.5	31.4

Table-14
Monthly fluctuation of P^H of the studied ponds during the year 1998-1999.

Pond	April'98 (ppm)	May'98 (ppm)	June'98 (ppm)	July'98 (ppm)	August'98 (ppm)	September'98 (ppm)	October'98 (ppm)	November'98 (ppm)	December'98 (ppm)	January'99 (ppm)	February'99 (ppm)	March'99 (ppm)
Pond-1	6.9	6.8	7	7.1	7	7.2	6.8	6.5	6.7	6.8	7	7.1
Pond-2	6.7	6.8	6.7	7.1	7.1	7.2	7.4	6.9	6.8	6.6	7.1	7.1
Pond-3	7.2	7.4	7.2	7.1	7.1	6.9	6.5	7.1	7.3	7.6	7.6	8.3
Pond-4	7	7.2	7	7.1	7.1	6.9	6.3	7.2	7.3	7.7	7.7	8.4
Pond-5	6.6	6.3	6.7	7.1	7.3	6.9	6.8	7	7.2	6.8	6.6	6.4
Pond-6	6.7	6.4	6.8	7	7.2	7	6.7	7.1	7.3	7	6.7	6.5
Pond-7	6.8	6.9	7.1	7.5	7.3	7.1	7.2	6.9	6.8	7.1	7.3	7.5

Table-15
Monthly fluctuation of P^H of the studied ponds during the year 1999-2000.

Pond	April'99 (ppm)	May'99 (ppm)	June'99 (ppm)	July'99 (ppm)	August'99 (ppm)	September'99 (ppm)	October'99 (ppm)	November'99 (ppm)	December'99 (ppm)	January'2000 (ppm)	February'2000 (ppm)	March'2000 (ppm)
Pond-1	7	7.2	7.3	7.5	7.6	7.9	7.2	7	6.8	7.1	7.2	7
Pond-2	7.1	7.1	7	7.2	7	7.3	7.5	7	6.8	6.5	6.9	7
Pond-3	7.4	7.1	7.3	7.5	6.8	6.9	6.9	7.2	7.2	7.7	7.5	7.7
Pond-4	6.9	7	7.2	7.3	7.1	7.2	6.9	6.8	7	7.3	7.2	7
Pond-5	6.9	7.1	7.1	7.4	7.2	6.7	6.8	6.9	7.3	6.7	6.4	6.8
Pond-6	6.8	7.2	7.2	7.3	7.3	6.9	6.8	6.8	7.2	6.6	6.6	6.9
Pond-7	7	7.1	7.2	7.3	7	7.1	6.8	6.8	7	7.2	7.1	7.1

Table-16
Monthly fluctuation of Dissolved oxygen in pond water during the year 1998-1999.

Pond	April'98 (mg/liter)	May'98 (mg/liter)	June'98 (mg/liter)	July'98 (mg/liter)	August'98 (mg/liter)	September'98 (mg/liter)	October'98 (mg/liter)	November'98 (mg/liter)	December'98 (mg/liter)	January'99 (mg/liter)	February'99 (mg/liter)	March'99 (mg/liter)
Pond-1	7.1	7	7.2	6.5	6.8	7	7.5	7.3	7.1	6.9	7	7
Pond-2	7.2	7	7.1	7.1	6.9	6.8	6.9	7	7.1	7.1	6.8	7
Pond-3	8.4	7.8	7.4	8.6	7.4	7	6.5	8	10	10.3	9.6	12
Pond-4	8.4	7.7	7.6	8.5	7.8	7.2	7	8	8.6	8.9	9.3	9.6
Pond-5	8.4	8.3	8.7	8.1	8.1	8.6	8	7.7	8	7.7	8	6.9
Pond-6	8.5	8.1	8.9	8.2	8	8.9	8	7.8	8.1	7.8	8.1	7
Pond-7	9.1	8.4	8.1	8.5	8.1	8.3	8.1	8.5	8.4	8.3	8.2	8.7

Table-17
Monthly fluctuation of Dissolved oxygen in pond water during the year 1999-2000.

Pond	April'99 (mg/liter)	May'99 (mg/liter)	June'99 (mg/liter)	July'99 (mg/liter)	August'99 (mg/liter)	September'99 (mg/liter)	October'99 (mg/liter)	November'99 (mg/liter)	December'99 (mg/liter)	January'2000 (mg/liter)	February'2000 (mg/liter)	March'2000 (mg/liter)
Pond-1	7.7	7.4	7.6	7.4	7.5	8.2	8.1	8.10	7.15	7.4	7.5	7.2
Pond-2	7.6	7.7	7.5	7.8	7.5	8	8.5	7.9	7.5	6.9	7.4	7.5
Pond-3	8.3	8.1	8	7.8	7.9	8.1	7.0	8	10.2	10.1	9.7	10.3
Pond-4	9.2	8.7	8.4	8.3	8.1	7.9	7.8	7.8	8.1	8	8.4	8.5
Pond-5	8.1	8	8.3	8.7	8.8	8.9	8.1	7.6	8.2	7.4	8.2	7.3
Pond-6	8	8.1	8.2	8.4	8.6	8.5	8	7.8	7.9	7.9	8.1	7.8
Pond-7	9.2	8.5	8.1	8.2	8	7.8	7.7	7.9	8.3	8.1	8.2	8.6

Table-18
Monthly fluctuation of Carbon dioxide of the pond water during the year 1998-1999.

Pond	April'98 (mg/liter)	May'98 (mg/liter)	June'98 (mg/liter)	July'98 (mg/liter)	August'98 (mg/liter)	September'98 (mg/liter)	October'98 (mg/liter)	November'98 (mg/liter)	December'98 (mg/liter)	January'99 (mg/liter)	February'99 (mg/liter)	March'99 (mg/liter)
Pond-1	11	11.5	11.8	12	12.1	11.8	11.8	11.9	12	11	11.3	11.3
Pond-2	11.10	11.4	12	12.1	12.12	11.9	12	11.8	12.5	12.19	11.8	11.5
Pond-3	8.4	9.7	6	6	18	0	13.2	21.1	8.2	5.3	4.8	7
Pond-4	8.1	8.4	9	7	7.1	13	5	12	12.1	8	5.4	5
Pond-5	11	10.3	10.8	12.3	12	13	11.8	12.8	12	10.2	12.7	11
Pond-6	10	11.2	11	13	12.1	13	12	12.5	12.1	11	13	11.3
Pond-7	8.5	8	8.3	8.7	8.9	8.5	8.5	8.8	9	9.2	9.1	8.8

Table-19
Monthly fluctuation of Carbon dioxide of the studied ponds water during the year 1999-2000.

Pond	April'99 (mg/liter)	May'99 (mg/liter)	June'99 (mg/liter)	July'99 (mg/liter)	August'99 (mg/liter)	September'99 (mg/liter)	October'99 (mg/liter)	November'99 (mg/liter)	December'99 (mg/liter)	January'2000 (mg/liter)	February'2000 (mg/liter)	March'2000 (mg/liter)
Pond-1	11	10.9	11.7	11.9	11.9	11.8	12	12.7	12.5	12.3	11.8	11.6
Pond-2	10.9	11.1	11.3	11.48	11.33	12	12.3	12.1	11.5	11.3	12	12.4
Pond-3	8.5	9.3	6.3	6.7	13	7.3	7.8	5.3	7.2	6.1	5.3	6.5
Pond-4	8	7.8	7.7	7.4	8	8.3	7.5	7.4	8.2	8.3	8	7.8
Pond-5	12	11.2	11.4	10.8	10.3	10.1	12.3	12.1	12	11.5	10.8	11
Pond-6	11.8	11.3	11.5	10.9	10.9	10.5	11.9	11.8	11.7	11.3	10.6	10.5
Pond-7	8.3	7.9	7.9	7.6	8.2	8.1	7.9	7.6	8.1	8.2	8	7.9

Table-20

Monthly fluctuation of Alkalinity of the pond water during the year 1998-1999.

Pond	April'98 (ppm)	May'98 (ppm)	June'98 (ppm)	July'98 (ppm)	August'98 (ppm)	September'98 (ppm)	October'98 (ppm)	November'98 (ppm)	December'98 (ppm)	January'99 (ppm)	February'99 (ppm)	March'99 (ppm)
Pond-1	80	85	83	83	87	89	90	91	87	90	90.5	87
Pond-2	88	84	87	86	88	89	88	93	94	88	87	88
Pond-3	75	50	90	120	95	130	85	79	77	73	75	78
Pond-4	78	65	50	80	111	98	90	81	87	76	79	78
Pond-5	89	88	88	87	86	85	88	87	81	84	90	91
Pond-6	88	85	81	88	85	81	83	80	83	89	91	91
Pond-7	80	81	85	87	89	90	92	94	86	81	78	81

Table-21

Monthly fluctuation of Alkalinity of the pond water during the year 1999-2000.

Pond	April'99 (ppm)	May'99 (ppm)	June'99 (ppm)	July'99 (ppm)	August'99 (ppm)	September'99 (ppm)	October'99 (ppm)	November'99 (ppm)	December'99 (ppm)	January, 2000 (ppm)	February, 2000 (ppm)	March, 2000 (ppm)
Pond-1	89	91	92	91	89	95	97	87	89	84	81	78
Pond-2	85	83	82	85	82	81	87	84	89	90	92	83
Pond-3	78	61	87	107	99	118	83	81	79	78	79	84
Pond-4	75	71	70	78	74	75	78	91	82	84	81	77
Pond-5	84	86	88	87	86	85	87	84	81	83	84	91
Pond-6	81	80	83	85	83	89	85	83	87	82	81	82
Pond-7	79	83	84	81	85	83	81	79	78	76	80	81

Table-22

Monthly fluctuation of Hardness of the pond water during the year 1998-1999.

Pond	April'98 (mg/liter)	May'98 (mg/liter)	June'98 (mg/liter)	July'98 (mg/liter)	August'98 (mg/liter)	September'98 (mg/liter)	October'98 (mg/liter)	November'98 (mg/liter)	December'98 (mg/liter)	January'99 (mg/liter)	February'99 (mg/liter)	March'99 (mg/liter)
Pond-1	100	105	108	107	109	105	104	100	98.5	95.9	98.7	100
Pond-2	100	103	104	103	111	110	118	113	100	100.4	101	103
Pond-3	100.5	98.5	92	100.5	92	98.5	102	94	101	120	106	112.5
Pond-4	97.3	98	92.8	100	100.3	98	101	98	100	113	118	115
Pond-5	111	108	106	105	108	110	114	108	99	100	99	100
Pond-6	110	107	105	103	107	111	115	107	98.5	100	98	99
Pond-7	100	100.1	100.3	98	99	98.4	97	96.7	100.2	100.3	101	102

Table-23

Monthly fluctuation of Hardness of the pond water during the year 1999-2000.

Pond	April'99 (mg/liter)	May'99 (mg/liter)	June'99 (mg/liter)	July'99 (mg/liter)	August'99 (mg/liter)	September'99 (mg/liter)	October'99 (mg/liter)	November'99 (mg/liter)	December'99 (mg/liter)	January, 2000 (mg/liter)	February, 2000 (mg/liter)	March, 2000 (mg/liter)
Pond-1	118	120	121	130	135	119	125	121	117	123	120	118
Pond-2	110	117	118	120	118	123	119	119	103	110	117	120
Pond-3	101	102.3	98	95.9	99.4	103.5	101	96.8	102.4	111.5	107.2	110.3
Pond-4	99.1	97	95	100.3	100	101	107	107	105	103	99.3	99.2
Pond-5	114	104	103	101	103	113	107	103	100	111	112	111
Pond-6	113	101	102	111	108	115	117	112	111	105	104	105
Pond-7	99	101	103	101.3	104	103	110	109	106	107	100	101.3

Pond no. 1:

Table-24
Monthly fluctuation of Phytoplakton abundance in pond no. 1 during April'98-March'99.

Group	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Chlorophyceae	12999	13549	14298	8842	10239	10350	11131	11632	8964	9426	9031	7695
Cyanophyceae	1933	3817	9817	17758	5817	6080	1657	1230	6930	9930	7130	5767
Bacillariophyceae	4337	8087	11087	10390	3817	1903	2333	3358	3830	5387	4910	2517
Euglenophyceae	2118	3080	3133	3513	3137	2770	2180	2347	2041	2865	2730	2130
Total	21387	28533	38335	40503	23010	21105	17301	18567	21765	27608	23801	18109

Table-25
Percentage of Phytoplankton abundance in pond no. 1 during April'98-March'99.

Group	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Chlorophyceae	60.79	47.48	37.29	21.83	44.49	49.04	64.33	62.64	41.18	34.14	37.94	42.49
Cyanophyceae	9.03	13.37	25.60	43.84	25.28	28.80	9.57	6.62	31.84	35.96	29.94	31.84
Bacillariophyceae	20.28	28.34	28.92	25.65	16.58	9.01	13.48	18.08	17.59	19.51	20.62	13.89
Euglenophyceae	9.90	10.79	8.17	8.67	13.63	13.12	12.60	12.64	9.37	10.37	11.47	11.76
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table-26
Monthly fluctuation of Phytoplakton abundance in pond no. 1 during April'99-March, 2000.

Group	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Chlorophyceae	8800	8130	10295	10449	8499	10900	7060	9311	8380	9582	7243	5819
Cyanophyceae	2112	3056	7180	12133	7050	2050	2053	1633	3412	7018	6912	6180
Bacillariophyceae	5088	5113	6117	7130	3513	2530	2613	3810	2115	4113	4188	2056
Euglenophyceae	2833	2913	2118	2818	2056	2353	2318	2119	1830	3408	3013	2033
Total	18833	19212	25710	32530	21118	17833	14044	16873	15737	24121	21356	16088

Table-27
Percentage of Phytoplankton abundance in pond no. 1 during April'99-March, 2000.

Group	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Chlorophyceae	46.73	42.3	40.04	32.12	40.25	61.12	50.27	55.18	53.25	39.7	33.9	36.2
Cyanophyceae	11.21	15.9	27.99	37.3	33.38	11.5	14.62	9.68	21.68	29	32.4	38.4
Bacillariophyceae	27.02	26.6	23.79	21.92	16.64	14.19	18.61	22.58	13.44	17.1	19.6	12.8
Euglenophyceae	15.04	15.2	8.24	8.66	9.74	13.19	16.50	12.56	11.63	14.2	14.1	12.6
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond no. 2:

Table-28
Monthly fluctuation of Phytoplakton abundance in pond no. 2 during April'98-March'99.

Group	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Chlorophyceae	11913	12122	10353	12203	8410	8817	9428	8848	5470	7959	8600	5236
Cyanophyceae	2013	3107	6030	9333	5108	5130	1518	1530	7333	5117	4830	3933
Bacillariophyceae	4380	5817	7117	6080	2813	2030	2030	1817	3517	3310	3310	2117
Euglenophyceae	2081	1811	2033	1817	3003	2113	1933	1310	1837	1365	1371	1833
Total	20387	22857	25533	29433	19334	18090	14909	13505	18157	17731	18111	13119

Table-29
Percentage of Phytoplankton abundance in pond no. 2 during April'98-March'99.

Group	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Chlorophyceae	58.63	53.09	40.54	49.94	43.49	48.73	63.23	65.51	30.12	44.83	47.48	39.91
Cyanophyceae	9.90	13.59	23.61	38.19	26.41	28.35	10.18	11.32	40.38	28.82	26.66	29.97
Bacillariophyceae	21.55	25.44	27.87	24.88	14.54	11.22	13.61	13.45	19.36	18.64	18.27	16.13
Euglenophyceae	9.92	7.92	7.96	7.43	15.53	11.68	12.96	9.70	10.11	7.68	7.56	13.97
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table-30
Monthly fluctuation of Phytoplakton abundance in pond no. 2 during April'99-March, 2000.

Group	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Chlorophyceae	8686	7999	7733	7913	8131	4996	5220	4190	5035	4994	6758	4992
Cyanophyceae	3103	3918	5113	8986	5917	4908	1912	1933	3917	4917	5130	4018
Bacillariophyceae	3810	6130	6756	7113	3773	3093	2718	2807	4018	2418	3637	2977
Euglenophyceae	2711	2133	3118	2118	4009	3118	2730	2380	2310	1989	1289	2118
Total	18310	20180	22720	26130	21830	16115	12580	11310	15280	14318	16814	14105

Table-31
Percentage of Phytoplankton abundance in pond no. 2 during April'99-March, 2000.

Group	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Chlorophyceae	47.44	39.62	34.04	30.28	37.25	31.00	41.49	37.05	32.95	34.88	40.19	35.39
Cyanophyceae	16.95	19.42	22.50	34.39	27.10	30.46	15.20	17.09	25.63	34.34	30.51	28.49
Bacillariophyceae	20.81	30.38	29.74	27.22	17.28	19.19	21.60	24.82	26.30	16.89	21.63	21.11
Euglenophyceae	14.81	10.57	13.72	8.11	18.36	19.35	21.70	21.04	15.12	13.89	7.63	15.02
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond no. 3:

Table-32
Monthly fluctuation of Phytoplakton abundance in pond no. 3 during April'98-March'99.

Group	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Chlorophyceae	23500	29010	25250	30165	19085	18500	17000	19582	24000	30010	22125	15500
Cyanophyceae	5280	8175	17750	20100	12960	7160	1400	2050	11050	19000	15900	6000
Bacillariophyceae	6500	11150	15050	15430	8750	3200	2700	8000	8250	11500	4800	3500
Euglenophyceae	4500	5200	8600	8050	5800	4700	5000	5800	6000	7000	5000	4500
Total	39780	53535	66650	73745	46595	33560	26100	35432	49300	67510	47825	29500

Table-33
Percentage of Phytoplankton abundance in pond no. 3 during April'98-March'99.

Group	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Chlorophyceae	59.09	54.18	37.88	40.89	40.96	55.13	65.13	55.27	48.68	44.45	46.26	50.5
Cyanophyceae	13.27	15.27	26.63	27.25	27.81	21.33	5.34	5.79	22.41	28.14	33.25	20.3
Bacillariophyceae	16.33	20.83	22.58	20.92	18.78	9.54	10.34	22.58	16.73	17.03	10.03	11.86
Euglenophyceae	11.31	9.71	12.90	10.91	12.45	14.00	19.15	16.37	12.17	10.37	10.45	15.25
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table-34
Monthly fluctuation of Phytoplakton abundance in pond no. 3 during April'99-March, 2000.

Group	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Chlorophyceae	25830	24711	23180	26011	13011	21500	18936	17887	29081	24811	23113	17113
Cyanophyceae	4910	9501	14388	18711	14790	9230	2186	5813	9780	21533	17711	7856
Bacillariophyceae	5450	10750	17750	17350	9750	4236	3498	9311	11011	9622	6089	5361
Euglenophyceae	2666	5414	3893	5752	3759	3045	4818	5738	4654	5745	4220	2881
Total	38856	50376	59211	67830	41310	38011	29438	38749	54526	61711	51133	33211

Table-35
Percentage of Phytoplankton abundance in pond no. 3 during April'99-March, 2000.

Group	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Chlorophyceae	66.48	49.05	39.01	38.35	31.50	56.56	64.33	46.16	53.33	40.20	45.20	51.53
Cyanophyceae	12.64	18.86	24.30	27.59	35.80	24.28	7.43	15.00	17.94	34.90	34.64	23.65
Bacillariophyceae	14.02	21.36	29.98	25.58	23.60	11.14	11.88	24.03	20.19	15.59	11.91	16.14
Euglenophyceae	6.86	10.75	6.57	8.48	9.10	8.01	16.37	14.81	8.54	9.31	8.25	8.67
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond no. 4:

Table-36
Monthly fluctuation of Phytoplakton abundance in pond no. 4 during April'98-March'99.

Group	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Chlorophyceae	15973	25990	23120	28797	17310	15005	13468	19060	24247	20285	15913	8374
Cyanophyceae	4830	7867	18110	19150	11010	6680	1877	1533	9300	21783	17130	7333
Bacillariophyceae	7113	12330	13910	14770	7730	2930	2655	6750	6103	14133	5530	3067
Euglenophyceae	4030	4930	7180	7513	6130	5503	4733	5197	4800	5900	4730	4933
Total	36711	51117	62320	70230	42180	30118	22733	32540	44450	62101	43303	23707

Table-37
Percentage of Phytoplankton abundance in pond no. 4 during April'98-March'99.

Group	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Chlorophyceae	50.02	50.84	37.09	41.00	41.03	49.82	59.24	58.57	54.54	32.66	36.74	35.32
Cyanophyceae	15.11	15.39	29.05	27.26	26.10	22.17	8.25	4.71	20.92	35.07	39.55	30.93
Bacillariophyceae	22.26	24.12	22.32	21.03	18.32	9.72	11.67	20.74	13.73	22.75	12.77	12.93
Euglenophyceae	12.61	9.64	11.52	10.22	14.53	18.23	20.81	15.97	10.79	9.5	10.92	20.80
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table-38
Monthly fluctuation of Phytoplakton abundance in pond no. 4 during April'99-March, 2000.

Group	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Chlorophyceae	18970	20911	16238	22204	11757	18931	9220	18403	23874	3587	3511	3057
Cyanophyceae	5811	8113	19113	21150	13118	7318	2063	2833	10317	989	1871	2066
Bacillariophyceae	8715	14810	15730	16510	8811	3130	3371	7703	8719	348	828	1005
Euglenophyceae	2140	3497	6037	6037	7031	6330	5700	6599	5208	189	109	91
Total	35636	47331	57118	65901	40717	35709	20354	35538	48118	5113	6319	6219

Table-39
Percentage of Phytoplankton abundance in pond no. 4 during April'99-March, 2000.

Group	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Chlorophyceae	43.50	48.02	59.38	28.86	43.12	59.27	65.20	55.59	62.32	70.15	55.56	49.16
Cyanophyceae	49.27	28.33	31.08	55.68	34.47	21.52	25.28	29.52	31.09	19.34	29.61	33.22
Bacillariophyceae	5.99	23.18	6.05	12.96	18.32	16.92	5.99	12.81	5.33	6.81	13.10	16.12
Euglenophyceae	1.24	1.74	3.49	2.51	4.08	2.24	3.54	2.08	1.26	3.70	1.72	1.46
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond no. 5:

Table-40
Monthly fluctuation of Phytoplakton abundance in pond no. 5 during April'98-March'99.

Group	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Chlorophyceae	21820	27356	23245	29833	18510	16456	15386	17683	22838	27520	20611	13111
Cyanophyceae	5348	6741	16101	18256	10389	7536	2100	1809	10738	17541	13356	5438
Bacillariophyceae	5656	10321	14086	13156	8348	3326	2050	6080	6280	9980	4356	3021
Englenophyceae	2536	6743	9824	9135	5870	3900	4984	6566	7336	8669	5022	6670
Total	35360	51161	63256	70380	43117	31218	24520	32138	47192	63710	43345	28240

Table-41
Percentage of Phytoplankton abundance in pond no. 5 during April'98-March'99.

Group	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Chlorophyceae	60.85	53.47	36.74	42.38	42.92	52.71	62.74	55.02	48.36	43.19	47.55	46.42
Cyanophyceae	15.62	13.17	25.45	25.93	24.09	24.13	8.56	5.62	22.75	27.53	30.81	19.25
Bacillariophyceae	15.99	20.17	22.26	18.69	19.36	10.65	8.36	18.91	13.30	15.66	10.04	10.09
Euglenophyceae	7.54	13.17	15.36	12.97	13.61	12.49	24.32	20.43	15.54	13.60	11.58	23.61
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table-42

Monthly fluctuation of Phytoplakton abundance in pond no. 5 during April'99-March, 2000.

Group	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Chlorophyceae	19020	23615	22947	25799	14813	13815	11541	15488	17131	26174	14338	8792
Cyanophyceae	5050	7856	13380	20318	11033	8431	2728	2733	6080	7789	15188	6871
Bacillariophyceae	6133	13182	16018	10780	8090	4088	2933	5133	3212	5830	3870	3718
Englenophyceae	2930	5077	10033	11313	6177	4137	4330	5897	4113	3937	4912	5830
Total	33133	49730	62380	68210	40113	30471	21532	29251	30536	43730	38308	25211

Table-43

Percentage of Phytoplankton abundance in pond no. 5 during April'99-March, 2000.

Group	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Chlorophyceae	57.40	47.48	36.78	37.82	36.92	45.33	53.59	52.94	56.10	59.85	37.72	34.87
Cyanophyceae	15.24	15.79	21.44	29.78	27.50	27.66	12.66	9.34	19.91	17.81	39.64	27.25
Bacillariophyceae	18.52	26.50	25.67	15.80	20.16	13.41	13.62	17.54	10.51	13.33	10.10	14.74
Euglenophyceae	8.84	10.20	16.08	16.58	15.39	13.57	20.10	20.15	13.46	9.00	12.82	23.12
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond no. 6:

Table-44
Monthly fluctuation of Phytoplakton abundance in pond no. 6 during April'98-March'99.

Group	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Chlorophyceae	16508	18702	12909	20439	12496	16057	9618	13490	14510	17479	26601	13882
Cyanophyceae	7136	9390	17101	19118	11991	5115	3800	2919	7118	13540	17313	9118
Bacillariophyceae	5830	13310	19158	15038	10317	1823	3056	5733	3837	6031	8103	5443
Englenophyceae	1836	7118	11037	11113	6003	5118	3837	6108	4191	4530	6833	9677
Total	31310	48520	60205	65708	40807	28113	20311	28250	29636	41580	58850	38120

Table-45
Percentage of Phytoplankton abundance in pond no. 6 during April'98-March'99.

Group	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Chlorophyceae	52.72	38.54	21.44	31.10	30.62	57.11	47.35	47.75	48.92	42.03	45.20	36.41
Cyanophyceae	22.79	19.35	28.40	29.09	29.38	18.19	18.70	10.33	24.00	32.56	29.41	23.91
Bacillariophyceae	18.62	27.43	31.82	22.88	25.28	6.48	15.04	20.29	12.93	14.50	13.76	14.27
Euglenophyceae	5.87	14.67	18.33	16.91	14.71	18.20	18.89	21.62	14.13	10.89	11.61	25.38
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table-46

Monthly fluctuation of Phytoplakton abundance in pond no. 6 during April'99-March, 2000.

Group	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Chlorophyceae	15381	19063	10814	12533	7436	15205	6462	12468	14619	12657	23271	5217
Cyanophyceae	8376	8386	15711	23118	12351	6930	3519	4230	8930	15108	13809	13108
Bacillariophyceae	6156	16531	20356	18039	9877	2618	4018	6336	4787	7113	8118	3738
Englenophyceae	2118	5837	11876	13413	8038	7119	4233	7118	6187	4930	8013	11070
Total	32031	49787	58757	67103	37702	31872	18232	30152	34517	39718	53211	33133

Table-47

Percentage of Phytoplankton abundance in pond no. 6 during April'99-March, 2000.

Group	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Chlorophyceae	48.02	38.29	18.40	18.68	19.72	47.71	35.44	42.35	42.35	31.87	43.73	15.75
Cyanophyceae	26.15	16.78	26.74	34.45	32.76	21.74	19.30	14.03	25.87	38.04	25.95	39.56
Bacillariophyceae	19.22	33.20	34.64	26.88	26.20	8.21	22.04	21.01	10.87	17.91	15.26	11.28
Euglenophyceae	6.61	11.72	20.21	19.99	21.32	22.34	23.22	23.61	17.91	12.40	15.06	33.41
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond no. 7:

Table-48
Monthly fluctuation of Phytoplakton abundance in pond no. 7 during April'98-March'99.

Group	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Chlorophyceae	18807	20526	15957	20164	10192	17570	9125	17270	22894	9979	11468	5487
Cyanophyceae	5988	8903	20018	22112	14008	8030	2513	3612	11156	24011	22331	8219
Bacillariophyceae	8915	15030	16039	17030	9018	4018	3610	8130	9011	17118	7158	4133
Englenophyceae	2208	3571	6119	6712	7913	6718	5933	7001	5912	7030	7056	3352
Total	35918	48030	58131	66018	41131	36336	21181	36013	48973	58138	48013	21191

Table-49
Percentage of Phytoplankton abundance in pond no. 7 during April'98-March'99.

Group	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Chlorophyceae	52.36	42.73	27.41	30.54	24.77	48.35	43.08	47.95	46.74	17.16	23.88	25.89
Cyanophyceae	16.67	18.53	34.41	33.49	34.05	22.09	11.86	10.02	22.77	41.30	46.51	38.78
Bacillariophyceae	24.82	31.29	27.59	25.79	21.92	11.05	17.04	22.57	18.39	29.44	14.90	19.50
Euglenophyceae	6.15	7.43	10.52	10.16	19.23	18.48	28.01	19.44	12.07	12.09	14.69	15.81
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table-50
Monthly fluctuation of Phytoplakton abundance in pond no. 7 during April'99-March, 2000.

Group	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March,2000 (individual/liter)
Chlorophyceae	21083	20369	17608	21393	12134	18790	9275	17566	21586	9524	14200	6592
Cyanophyceae	6085	9003	20013	22107	15872	8091	3133	5315	14018	26108	23370	8918
Bacillariophyceae	9832	16711	17831	15118	9780	5108	6018	8718	9372	19363	7856	5869
Englenophyceae	3788	5718	7118	5719	8133	7119	7380	7133	6181	8118	5391	7136
Total	40788	51801	62570	64337	45919	39108	25806	39532	51157	63113	50817	28515

Table-51
Percentage of Phytoplankton abundance in pond no. 7 during April'99-March, 2000.

Group	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Chlorophyceae	51.69	39.32	28.14	33.25	26.43	48.05	35.94	44.44	42.20	15.09	27.94	23.12
Cyanophyceae	14.92	17.38	31.99	34.36	34.57	20.69	12.14	13.45	27.40	41.37	45.99	31.28
Bacillariophyceae	24.11	32.26	28.50	23.50	21.30	13.06	23.32	22.05	18.32	30.68	15.46	20.58
Euglenophyceae	9.28	11.04	11.38	8.89	17.71	18.20	28.66	20.07	12.08	12.86	10.61	25.03
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table-52
Maximum and minimum abundance of Phytoplankton in ponds during April'98-March'99.

Sample	Pond	Maximum		Minimum		Average (individual/liter)
		Month	Number (individual/liter)	Month	Number (individual/liter)	
Sample-1	Pond-1	July'98	40503	October'98	17305	25002
	Pond-2	July'98	29433	November'98	13505	19263
Sample-2	Pond-3	June'98	73745	March'98	26100	47461
	Pond-4	August'98	70230	November'98	22732	41562
Sample-3	Pond-5	July'98	70300	October'98	24520	44486
	Pond-6	September'98	65708	October'98	20311	40950
Sample-4	Pond-7	June'98	66018	November'98	21181	41671

Table-53
Maximum and minimum abundance of Phytoplankton in ponds during March'99-April, 2000.

Sample	Pond	Maximum		Minimum		Average (individual/liter)
		Month	Number (individual/liter)	Month	Number (individual/liter)	
Sample-1	Pond-1	July'99	32530	October'99	14044	20286
	Pond-2	July'99	26130	November' 99	11310	17474
Sample-2	Pond-3	July'99	67830	October'99	29438	47029
	Pond-4	April'99	35636	August'99	40717	33672
Sample-3	Pond-5	July'99	68210	October'99	21532	39418
	Pond-6	June'99	67103	October'99	18232	40517
Sample-4	Pond-7	July'99	64337	March'200 0	28515	46955

Table-54
Maximum & minimum abundance of Chlorophyceae in ponds during April'98-March'99.

Sample	Pond	Maximum		Minimum		Average (individual/liter)
		Month	Number (individual/liter)	Month	Number (individual/liter)	
Sample-1	Pond-1	June'98	14298	March'99	7695	10679
	Pond-2	July'98	12203	March'99	5236	9113
Sample-2	Pond-3	July'98	30165	March'99	15500	22810
	Pond-4	July'98	28795	March'99	8374	18961
Sample-3	Pond-5	July'98	29833	March'99	13111	21197
	Pond-6	July'98	20439	October'99	9618	16057
Sample-4	Pond-7	Decembe r'98	22894	March'99	5487	14953

Table-55
Maximum & minimum abundance of Chlorophyceae in ponds during April'99-March, 2000.

Sample	Pond	Maximum		Minimum		Average (individual/liter)
		Month	Number (individual/liter)	Month	Number (individual/liter)	
Sample-1	Pond-1	September'99	10900	March, 2000	5819	8705
	Pond-2	April'99	8686	November, 2000	4170	6387
Sample-2	Pond-3	December'99	29081	August'99	13011	22098
	Pond-4	December'99	23874	March, 2000	3057	14221
Sample-3	Pond-5	July'99	25799	March, 2000	8792	17789
	Pond-6	February'2000	23271	March, 2000	5217	12927
Sample-4	Pond-7	July'99	21393	March, 2000	6592	15842

Table-56
Maximum & minimum abundance of Cyanophyceae in ponds during April'98-March'99.

Sample	Pond	Maximum		Minimum		Average (individual/liter)
		Month	Number (individual/liter)	Month	Number (individual/liter)	
Sample-1	Pond-1	July'98	17758	November'98	1230	6488
	Pond-2	July'98	9333	October'98	1518	4581
Sample-2	Pond-3	July'98	20100	October'98	1400	10568
	Pond-4	July'98	19150	November'98	1533	10550
Sample-3	Pond-5	July'98	18250	November'98	1809	9612
	Pond-6	July'98	19118	November'98	2919	10304
Sample-4	Pond-7	January'99	24011	October'98	2513	12575

Table-57
Maximum & minimum abundance of Cyanophyceae in ponds period, April'99-March, 2000.

Sample	Pond	Maximum		Minimum		Average (individual/liter)
		Month	Number (individual/liter)	Month	Number (individual/liter)	
Sample-1	Pond-1	July'99	12133	November'99	1633	5065
	Pond-2	July'99	8986	October'99	1912	4481
Sample-2	Pond-3	January, 2000	21533	October'99	2186	11367
	Pond-4	July'99	21150	January, 2000	989	7896
Sample-3	Pond-5	July'99	20318	October'99	2728	8954
	Pond-6	July'99	23118	October'99	3519	11128
Sample-4	Pond-7	January, 2000	26108	October'99	3133	13502

Table-58
Maximum & minimum abundance of Euglenophyceae in ponds April'98-March'99.

Sample	Pond	Maximum		Minimum		Average (individual/liter)
		Month	Number (individual/liter)	Month	Number (individual/liter)	
Sample-1	Pond-1	July'98	3513	December'98	2041	2670
	Pond-2	August'98	3003	November'98	1310	1875
Sample-2	Pond-3	June'98	8600	March'99	4500	5845
	Pond-4	July'98	7513	April'98	4030	5464
Sample-3	Pond-5	June'98	9824	April'98	2536	6437
	Pond-6	July'98	11113	April'98	1836	6450
Sample-4	Pond-7	August'98	7913	April'98	2208	5793.75

Table-59
Maximum & minimum abundance of Euglenophyceae in ponds April'99-March, 2000.

Sample	Pond	Maximum		Minimum		Average (individual/liter)
		Month	Number (individual/liter)	Month	Number (individual/liter)	
Sample-1	Pond-1	January, 2000	3408	December'99	1836	2484
	Pond-2	August, 2000	4009	February, 2000	1289	2501
Sample-2	Pond-3	July'99	5752	April'99	2666	4382
	Pond-4	August'99	7031	March'2000	91	4080
Sample-3	Pond-5	July'99	11313	April'99	2930	5723
	Pond-6	July'99	13413	April'99	2118	7496
Sample-4	Pond-7	August'99	8133	April'99	3788	6577

Table-60
Maximum & minimum abundance of Bacillariophyceae in ponds April'98-March'99.

Sample	Pond	Maximum		Minimum		Average (individual/liter)
		Month	Number (individual/liter)	Month	Number (individual/liter)	
Sample-1	Pond-1	June'98	11087	September'98	1903	5163
	Pond-2	June'98	7117	November'98	1817	3694
Sample-2	Pond-3	July'98	15430	October'98	2700	5845
	Pond-4	July'98	14770	October'98	2655	8085
Sample-3	Pond-5	June'98	14086	October'98	2050	7221
	Pond-6	June'98	19158	September'98	1823	8139
Sample-4	Pond-7	July'98	17030	October'98	3610	9934

Pond no. 1

Table-63

Percentage of Zooplankton in different ponds in different months during April'98-March'99.

Group	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Rotifera	31.04	33.24	19.94	12.77	12.57	28.42	23.69	27.97	19.66	24.62	24.84	20.85
Cladocera	11.43	11.86	16.06	15.57	14.91	8.78	24.16	18.46	26.81	27.71	22.85	14.08
Copepoda	14.49	12.94	18.37	20.08	22.84	22.56	26.37	23.12	18	5.40	13.32	23.25
Ostracoda	12.19	8.16	9.49	11.94	6.00	6.55	8.02	7.88	15.75	17.32	11.91	14.12
Nauplius	15.83	10.69	11.23	14.65	4.97	18.40	9.30	7.65	7.69	17.86	11.90	14.98
Protozoan	14.55	22.65	24.46	24.60	38.36	15.08	7.44	14.60	11.77	10.88	14.79	14.08
Others	.44	.44	.41	.37	.31	.18	.98	.29	.27	.37	.35	.44
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond-1

Table-64

Monthly abundance of Zooplankton in different pond in the period of April'99-March, 2000.

Group	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Rotifera	1384	2604	2572	1604	1658	1974	2200	2684	2657	2588	2600	2071
Cladocera	1217	1610	1633	1312	1543	903	1813	1618	1830	2018	2033	1108
Copepoda	933	1230	1418	1684	1810	2050	2009	2184	1543	1067	1643	1838
Ostracoda	1413	1110	1084	1133	933	911	667	968	1318	1288	1508	1127
Nauplius	1610	1318	1531	1718	1118	2223	1013	1113	1170	1318	1188	1133
Protozoan	1418	2830	2030	1730	3018	1158	810	1508	1533	984	1512	968
Others	81	77	43	52	43	37	58	43	72	79	87	43
Total	8056	10780	10311	9233	10133	9256	8570	10118	10123	9342	10571	8288

Pond no. 3

Table-71
Percentage of Zooplankton in different ponds in different months during April'98-March'99.

Group	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Rotifera	24.09	27.18	17.68	21.27	23.12	19.40	34.39	40.61	40.58	34.78	43.02	30.87
Cladocera	16.62	9.68	14.39	24.72	22.61	19.27	14.25	12.56	22.79	22.47	24.62	19.07
Copepoda	17.71	16.71	19.73	26.42	26.27	27.66	28.25	30.96	9.17	2.61	6.89	14.24
Ostracoda	11.10	4.84	4.32	6.8	3.19	5.11	6.14	6.56	12.79	8.84	7.74	9.54
Nauplius	12.40	8.36	11.01	9.27	5.56	6.95	8.73	2.68	6.16	12.27	10.40	9.86
Protozoan	17.71	35.19	32.29	11.38	18.76	21.40	7.44	6.45	8.44	19.05	14.98	15.88
Others	.35	.24	.58	.15	.49	.21	.79	.14	.06	—	.35	.51
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond no. 3

Table-72
Monthly abundance of Zooplankton in different ponds during April'99-March, 2000.

Group	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Rotifera	4713	4003	4017	5308	3533	3312	6172	9117	4708	3275	5718	3512
Cladocera	2963	2007	3137	5633	3618	3118	2930	3031	4912	3018	3712	3008
Copepoda	2899	2613	4318	5918	4012	4703	5012	6910	1212	826	1130	2013
Ostracoda	2181	773	713	2112	618	1033	566	2625	2201	1013	1518	1418
Nauplius	2318	2333	2312	2503	1009	1518	1591	1040	1213	1233	1717	1550
Protozoan	3298	5543	5808	2280	2207	4146	2285	1148	770	2144	1316	2383
Others	58	69	177	57	111	75	157	37	39	8	59	117
Total	18430	17341	20536	23811	15108	17405	18713	23908	15055	11517	15170	14001

Pond no. 3

Table-73

Percentage of Zooplankton in different ponds in different months during April'99-March, 2000.

Group	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Rotifera	25.57	23.09	19.82	22.29	23.38	18.30	32.98	38.13	31.27	28.44	37.70	25.08
Cladocera	16.08	11.57	15.28	23.66	23.95	17.41	15.66	12.68	32.62	26.20	24.47	21.48
Copepoda	15.73	15.07	21.03	24.85	26.56	26.24	26.78	28.90	8.05	7.17	7.45	14.38
Ostracoda	11.83	4.46	3.43	8.87	4.09	5.77	3.02	10.98	14.61	8.80	10.01	10.13
Nauplius	12.58	13.45	11.26	10.51	6.68	8.48	8.50	4.35	8.05	10.71	11.32	11.07
Protozoan	17.90	31.96	28.28	9.58	16.61	23.16	12.25	4.80	5.11	18.63	8.68	17.02
Others	.31	.40	.86	.24	.73	.42	.84	.15	.25	.07	.39	.85
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond no. 4

Table-74

Monthly abundance of Zooplankton in pond application in the period of April'98-March'99.

Group	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Rotifera	3893	5877	3813	4330	2100	3070	3136	5200	3164	2833	3876	2944
Cladocera	2137	2109	3866	1429	2177	1288	2909	2637	4933	2199	2900	2050
Copepoda	2933	3330	4109	5730	3365	3088	2880	5735	1733	581	1180	2809
Ostracoda	1677	1357	1830	1533	630	920	937	1621	1933	1597	1630	1711
Nauplius	2307	2139	3151	1921	733	1910	884	847	911	2137	1590	1788
Protozoan	2811	5842	4659	2331	4103	1820	933	1711	1618	1137	1890	1930
Others	77	51	79	37	103	17	108	37	18	33	57	71
Total	15835	20705	21507	17311	13211	12113	11787	17780	14311	11521	13125	13303

Pond no. 4

Table-75
Percentage of Zooplankton in different ponds in different months during April'98-March'99.

Group	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Rotifera	24.58	28.38	17.72	25.01	15.89	25.34	26.60	29.23	22.10	26.93	29.53	22.13
Cladocera	13.49	10.18	17.97	8.25	16.47	10.63	24.67	14.82	34.46	20.90	22.09	15.41
Copepoda	18.52	16.08	19.10	33.10	25.47	25.49	24.43	32.24	12.10	5.53	8.99	21.11
Ostracoda	10.59	6.55	8.50	8.85	4.76	7.59	7.94	9.11	13.50	15.18	12.41	12.86
Nauplius	14.56	10.33	14.65	11.09	5.54	15.76	7.49	4.76	6.36	20.31	12.11	13.44
Protozoan	17.75	28.21	21.66	13.46	31.05	15.02	7.91	9.61	11.30	10.81	14.4	14.50
Others	.48	.24	.36	.21	.77	.14	.91	.20	.12	.31	.43	.53
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond no. 4

Table-76
Monthly abundance of Zooplankton in different ponds during April'99-March, 2000.

Group	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Rotifera	4170	6188	2911	4573	1818	4376	2247	5738	2749	2688	3528	3975
Cladocera	2662	1537	4118	721	2030	1819	2603	2083	5117	2799	3948	2018
Copepoda	3526	3818	4393	6371	2490	4039	3730	2150	2071	2780	1833	3677
Ostracoda	2316	1709	2330	2179	1003	1348	1730	2171	2239	2733	1531	2737
Nauplius	2809	1591	3509	2397	921	2518	1513	538	1148	2318	2518	2718
Protozoan	2868	4561	2367	1803	1469	2921	1071	2111	2353	817	2890	2919
Others	91	73	83	53	73	89	117	83	78	18	103	89
Total	18351	19477	19711	18103	9804	17110	13011	14874	15755	14153	16351	18133

Pond no. 4

Table-77
Percentage of Zooplankton in different ponds in different months during April'99-March, 2000.

Group	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Rotifera	22.72	31.77	14.70	25.26	18.53	25.57	17.27	38.57	17.44	18.99	21.57	21.92
Cladocera	14.50	7.89	20.89	3.98	20.70	10.63	20.06	14.00	32.51	19.77	24.14	11.12
Copepoda	19.21	19.60	22.28	35.22	25.39	23.60	28.66	14.45	13.14	19.64	11.21	20.27
Ostracoda	12.62	8.77	11.82	12.03	10.23	7.87	13.29	14.59	14.21	19.31	9.36	15.09
Nauplius	15.30	8.16	17.80	13.24	9.39	14.71	11.62	3.61	7.28	16.37	15.39	14.98
Protozoan	15.62	23.41	12.00	9.95	14.98	17.07	8.23	14.19	14.93	5.77	17.67	16.09
Others	.49	.37	.42	.29	.74	.52	.81	.55	.49	.12	.62	.49
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond no. 5

Table-78
Monthly abundance of Zooplankton in different ponds during April'98-March'99.

Group	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Rotifera	3805	5830	3980	3730	3000	1800	4243	8809	5606	4472	3823	2992
Cladocera	2045	1803	2800	3910	3080	1655	1603	2053	3773	3105	3433	3605
Copepoda	3000	3300	3100	3549	3157	3077	3309	5003	1411	561	1020	2701
Ostracoda	1600	700	730	1108	380	530	707	1112	2050	1861	1356	1855
Nauplius	1318	1200	1705	1403	313	833	931	411	1703	2103	1840	1933
Protozoan	3056	5407	7405	2030	1520	2518	844	1400	1800	2939	2080	2140
Others	36	80	140	40	80	31	101	42	37	39	51	80
Total	14860	18320	19860	15770	11530	10444	11738	18830	16380	15080	13603	15306

Pond no. 5

Table-79

Percentage of Zooplankton in different ponds in different months during April'98-March'99.

Group	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Rotifera	25.60	31.82	20.04	23.65	26.01	17.23	36.14	46.78	34.22	29.65	28.10	19.54
Cladocera	13.76	9.84	14.09	24.79	26.71	15.84	13.65	10.90	23.03	20.59	25.23	23.55
Copepoda	20.18	18.01	15.60	22.50	27.38	29.46	28.19	26.56	8.61	3.72	7.49	17.64
Ostracoda	10.76	3.82	3.53	7.02	3.29	5.07	6.03	5.90	12.51	12.34	9.96	12.11
Nauplius	8.86	6.55	8.58	8.89	2.71	7.97	7.93	2.18	10.39	13.94	13.52	12.62
Protozoan	20.56	29.51	37.28	12.87	13.18	24.10	7.19	7.43	10.98	19.48	15.29	13.98
Others	.24	.43	.70	.25	.69	.29	.86	.22	.22	.25	.37	.52
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond no. 5

Table-80

Monthly abundance of Zooplankton in different ponds during April'99-March, 2000.

Group	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Rotifera	3935	6104	2311	4480	2222	1418	3936	8755	5262	3022	3325	3049
Cladocera	2237	2418	3133	4130	3671	1913	2631	2631	4133	3413	2927	3833
Copepoda	3218	3987	3780	4230	3847	2893	4880	4733	1808	881	833	2901
Ostracoda	1932	1113	980	1588	1371	1180	1837	1908	1980	2130	1113	1638
Nauplius	1156	1918	2477	2133	963	1188	1080	831	2330	2680	2130	1630
Protozoan	4831	6233	8341	2318	2180	2930	1177	1881	2118	3121	2138	1871
Others	71	83	111	69	77	67	731	87	80	71	67	74
Total	17380	21856	21133	18948	14331	11581	15672	20856	17711	15318	12533	14996

Pond no. 5

Table-81

Percentage of Zooplankton in different ponds in different months during April'99-March, 2000.

Group	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Rotifera	22.64	27.92	10.93	23.64	15.50	12.24	25.11	42.12	29.71	19.72	26.52	20.33
Cladocera	12.87	11.06	14.82	21.79	25.61	16.54	16.11	12.61	23.33	22.28	23.35	25.56
Copepoda	18.51	18.24	17.88	22.32	26.84	24.98	31.13	22.69	10.20	5.75	6.64	19.34
Ostracoda	11.11	5.09	4.63	8.38	9.56	10.18	11.72	9.14	11.17	13.90	8.88	10.92
Nauplius	6.6	8.77	11.72	11.25	6.71	10.25	6.89	3.98	13.15	17.49	16.99	10.8
Protozoan	27.7	28.5	39.46	12.29	15.21	25.30	7.51	9.01	11.95	20.37	17.05	12.48
Others	.40	.37	.52	.36	.53	.57	.83	.41	.45	.46	.53	.49
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond no. 6

Table-82

Monthly abundance of Zooplankton in different ponds during April'98-March'99.

Group	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Rotifera	2723	3879	4203	3210	3182	1839	2403	6975	4246	3139	3805	2699
Cladocera	2133	2130	3605	3633	1963	1313	1918	2536	3108	1830	2857	2833
Copepoda	2856	3168	4080	2833	2837	1911	1933	3370	718	630	710	3100
Ostracoda	1558	749	810	811	118	710	1003	536	1553	868	1180	1903
Nauplius	1401	1366	1355	1537	112	930	730	320	2103	1338	1330	1508
Protozoan	2857	4807	2711	1318	933	1867	933	1100	1900	3133	1888	1833
Others	38	67	137	28	58	18	91	19	28	80	41	57
Total	13566	16166	16911	13320	9203	8110	9011	14836	13656	11018	11811	13933

Pond no. 6

Table-83
Percentage of Zooplankton in different ponds in different months during April'98-March'99.

Group	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Rotifera	20.07	23.99	24.85	24.09	34.57	22.67	26.66	46.95	31.09	28.48	32.21	19.37
Cladocera	15.72	13.17	21.31	27.27	21.33	16.18	21.28	17.07	22.75	16.60	24.18	20.33
Copepoda	21.05	19.59	24.12	21.26	30.82	23.56	21.45	22.68	5.25	5.71	6.01	22.24
Ostracoda	11.48	4.63	4.78	6.08	1.28	8.75	11.13	3.60	11.37	7.87	9.99	13.65
Nauplius	10.32	8.44	8.01	11.53	1.21	11.46	8.10	2.15	15.39	12.14	11.26	10.82
Protozoan	21.06	29.73	16.03	9.89	10.13	23.03	10.35	7.40	13.91	28.43	15.98	13.15
Others	.28	.41	.81	.21	.63	.22	1.00	.12	.20	.72	.34	.40
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond no. 6

Table-84
Monthly abundance of Zooplankton in different ponds during April'99-March, 2000.

Group	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Rotifera	2944	6102	6598	4546	4369	2248	3786	5758	2331	4250	2624	1991
Cladocera	2718	2526	3918	3218	1708	1818	2118	1903	4380	2513	3230	2518
Copepoda	3890	2218	3172	3130	2213	2213	933	1830	1318	819	1418	3303
Ostracoda	1897	1130	333	1113	708	1113	2009	1130	2918	1130	1631	2318
Nauplius	1979	1918	1830	1918	1030	1188	1830	580	4280	2056	1837	1730
Protozoan	2435	3133	3056	1807	1718	2130	1130	1830	2301	3918	2718	2380
Others	59	103	111	81	87	89	101	78	49	71	65	78
Total	15870	17130	19018	15813	11833	10799	11907	13109	17577	14774	13523	14318

Pond no. 6

Table-85
Percentage of Zooplankton in different ponds in different months during April'99-March, 2000.

Group	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Rotifera	18.55	35.62	34.69	28.74	36.92	20.18	31.79	43.92	13.26	28.76	19.40	13.90
Cladocera	17.12	14.74	20.60	20.35	14.43	16.83	17.78	14.51	24.91	17.00	23.88	17.58
Copepoda	24.51	12.94	16.67	19.79	18.70	20.49	7.83	13.95	7.99	5.54	10.48	23.06
Ostracoda	11.95	6.59	1.75	7.03	5.98	10.30	16.87	8.62	16.60	7.64	12.06	16.18
Nauplius	12.47	11.19	9.62	12.12	8.70	11.00	15.36	4.42	24.35	13.91	13.58	12.08
Protozoan	15.34	18.28	16.06	11.42	14.51	19.72	9.49	13.95	13.09	26.51	20.09	16.62
Others	.37	.60	.58	.51	.73	.82	.84	.59	.27	.48	.48	.54
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond no. 7

Table-86
Monthly abundance of Zooplankton in different ponds during April'98-March'99.

Group	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Rotifera	3988	6125	2618	4286	1184	4228	2328	4883	1597	2605	3152	3550
Cladocera	2712	1718	3912	1012	2318	2118	2930	2166	6108	3056	4112	2213
Copepoda	3603	4012	4517	6517	2610	4243	4142	2418	2379	3108	2130	3801
Ostracoda	2408	1813	2611	2380	1135	1572	1810	2513	2318	2837	1818	2893
Nauplius	2856	1703	3733	2612	1072	2768	1718	712	1256	2618	2637	2872
Protozoan	3112	4683	2508	1933	1613	3012	1133	2303	2613	917	2872	3112
Others	101	78	89	63	79	92	79	93	85	39	110	93
Total	18780	20132	19988	18803	10011	18033	14140	15088	16356	15180	16831	18534

Pond no. 7

Table-87
Percentage of Zooplankton in different ponds in different months during April'98-March'99.

Group	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Rotifera	21.23	30.42	13.09	22.79	11.82	23.44	16.40	32.36	9.76	17.16	18.72	19.15
Cladocera	14.46	8.53	19.57	5.38	23.52	11.74	20.72	14.35	37.34	20.13	24.43	11.94
Copepoda	19.18	19.92	22.59	34.65	26.07	23.72	29.29	16.02	14.54	20.47	12.65	20.50
Ostracoda	12.82	9.00	13.06	12.65	11.33	8.71	12.80	16.65	14.17	18.68	10.80	15.60
Nauplius	15.20	8.45	18.67	13.89	10.78	15.39	12.14	4.71	7.67	17.24	15.66	15.49
Protozoan	16.57	23.26	12.54	10.28	16.11	16.90	8.01	15.26	15.97	6.04	17.06	16.79
Others	.53	.38	.44	.33	.78	.51	.55	.61	.51	.25	.65	.50
Total	100	100	100	100	100	100	100	100	100	100	100	100

Pond no. 7

Table-88
Monthly abundance of Zooplankton in different ponds during April'99-March, 2000.

Group	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Rotifera	5750	3873	4834	5007	2244	5037	2788	5042	3338	4082	3146	3928
Cladocera	2015	2513	3127	2318	2308	2031	3033	3418	5729	3311	4118	2537
Copepoda	4113	4440	5080	5731	2910	4244	4131	3377	3077	3733	2131	4018
Ostracoda	3003	2317	3113	3733	1133	1877	2173	3037	3718	3718	2618	3278
Nauplius	3018	2059	4018	3610	1072	2910	1718	1633	2618	3177	3163	3131
Protozoan	3156	4818	3117	2113	1812	3008	1129	3107	3307	2013	3718	3088
Others	101	98	81	59	98	81	127	89	119	78	111	137
Total	21156	20118	23370	22571	11577	19188	15055	19703	21308	20112	19005	20117

Pond no. 7

Table-89

Percentage of Zooplankton in different ponds in different months during April'99-March, 2000.

Group	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Rotifera	27.18	19.25	20.69	22.18	19.38	26.25	18.23	25.59	15.67	20.30	16.55	19.53
Cladocera	9.53	12.49	13.38	10.27	19.94	10.59	20.15	17.35	24.11	16.46	21.67	12.61
Copepoda	19.44	22.07	21.74	25.39	25.14	22.12	27.44	17.14	14.44	18.56	11.27	19.97
Ostracoda	14.20	11.52	13.32	16.54	9.79	9.78	14.43	15.41	17.95	18.49	13.78	16.30
Nauplius	14.27	10.24	17.19	15.99	9.26	15.17	11.41	8.29	12.29	15.80	16.64	15.56
Protozoan	14.92	23.95	13.34	9.36	15.65	15.68	7.50	15.79	15.52	10.01	19.18	15.35
Others	.48	.49	.35	.26	.85	.42	.84	.45	.56	.39	.58	.68
Total	100	100	100	100	100	100	100	100	100	100	100	100

Table-90

Monthly abundance of Rotifera in different ponds water during April'98-March'99.

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	2803	3693	2375	1323	1548	3166	2325	3665	2223	3128	2859	2269
	Pond-2	2586	3461	733	1109	1830	1997	2052	2150	1373	1818	1666	1115
Sample-2	Pond-3	4080	6180	4300	4130	3800	3100	5082	8180	7300	5112	6167	5018
	Pond-4	3893	5877	3813	4330	2100	3070	3136	5200	3164	2833	3876	2944
Sample-3	Pond-5	3805	5830	3980	3730	3000	1800	4243	8809	5606	4473	7823	2992
	Pond-6	2723	3879	4203	3210	3182	1834	2403	6975	4246	3139	3805	2699
Sample-4	Pond-7	3988	6125	2618	4286	1184	4228	2328	4883	1597	2605	3152	3550

Table-91
Percentage of Rotifera in different ponds during April'98-March'99.

Sample	Pond	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Sample-1	Pond-1	31.04	33.24	19.94	12.77	12.57	28.42	23.69	27.97	19.66	24.62	24.84	20.85
	Pond-2	29.38	32.01	6.98	11.47	15.53	19.36	21.64	18.50	13.39	16.03	16.45	11.36
Sample-2	Pond-3	24.09	27.18	17.68	21.27	23.12	19.40	34.33	40.61	40.58	34.78	43.02	30.87
	Pond-4	24.58	28.38	17.72	25.01	15.89	25.34	26.60	29.23	22.10	26.93	29.53	22.13
Sample-3	Pond-5	25.60	31.82	20.04	23.65	26.01	17.23	36.14	46.78	34.22	29.65	28.10	19.54
	Pond-6	20.07	23.99	24.85	24.09	34.67	22.67	26.66	46.95	31.09	28.48	32.88	19.37
Sample-4	Pond-7	21.23	30.42	13.09	22.75	11.82	23.44	16.40	32.36	9.76	17.16	18.72	19.15

Table-92
Monthly abundance of Rotifera in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	1384	2604	2576	1604	1698	1974	2200	2684	2657	2588	2600	2078
	Pond-2	1480	3013	1197	1313	1888	1420	2129	2056	1503	1687	1196	1432
Sample-2	Pond-3	4713	4003	4071	5308	3533	3312	6172	9117	4708	3275	5718	3517
	Pond-4	4170	6188	2917	5473	1818	4376	2247	5731	2743	2688	3528	3975
Sample-3	Pond-5	3935	6104	2311	4480	2222	1418	3936	8755	5262	3022	3325	3049
	Pond-6	2944	6102	6598	4546	4369	2248	3786	5758	2331	4250	2624	1991
Sample-4	Pond-7	5750	3873	4834	5007	2244	5037	2788	5042	3338	5082	3146	3928

Table-93

Percentage of Rotifera in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Sample-1	Pond-1	17.18	24.16	24.96	17.37	16.36	21.33	25.67	26.53	26.25	27.70	26.6	24.99
	Pond-2	20.68	30.65	10.83	16.18	17.62	14.92	20.62	20.13	16.31	21.06	12.50	17.21
Sample-2	Pond-3	25.57	23.09	19.82	22.29	23.38	18.30	32.98	38.13	31.27	28.44	37.70	25.08
	Pond-4	22.72	31.77	14.70	25.26	18.53	25.57	17.27	38.57	17.44	18.99	21.57	21.92
Sample-3	Pond-5	22.64	27.92	10.93	23.64	15.50	12.24	25.11	42.12	29.71	19.72	26.52	20.33
	Pond-6	18.55	35.62	34.69	28.74	36.92	20.81	31.79	13.92	13.26	28.76	19.40	13.90
Sample-4	Pond-7	27.18	19.25	20.69	22.18	19.38	20.25	18.23	25.59	15.67	20.30	16.53	19.53

Table-94

Monthly abundance of *Keratella* in different ponds during April'98-March'99.

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	317	397	207	138	201	518	367	407	190	539	813	400
	Pond-2	218	341	70	97	252	399	301	257	103	330	510	256
Sample-2	Pond-3	433	633	395	350	370	450	705	480	740	1028	1569	1100
	Pond-4	378	518	638	419	282	336	380	867	405	238	586	418
Sample-3	Pond-5	517	987	521	503	487	188	779	1603	998	683	518	390
	Pond-6	256	510	612	498	419	183	312	1165	617	488	603	303
Sample-4	Pond-7	528	988	340	703	103	612	280	678	137	351	728	528

Table-95

Monthly abundance of *Keratella* in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	138	260	203	122	151	277	305	290	260	540	691	430
	Pond-2	153	312	190	79	186	180	214	148	135	303	231	311
Sample-2	Pond-3	477	530	711	740	488	410	930	1280	512	433	870	571
	Pond-4	733	886	403	413	167	407	297	717	310	530	476	503
Sample-3	Pond-5	513	837	217	684	211	140	508	1537	793	419	481	411
	Pond-6	298	835	930	657	615	208	537	970	213	608	213	195
Sample-4	Pond-7	972	508	713	882	298	833	312	778	472	573	430	538

Table-96

Monthly abundance of *Filina* in different ponds during April'98-March'99.

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	361	360	937	408	403	437	308	301	185	299	131	70
	Pond-2	271	317	121	250	445	317	259	218	121	107	91	37
Sample-2	Pond-3	580	1300	1733	1420	1149	390	700	675	738	411	280	290
	Pond-4	301	503	318	328	336	436	319	633	293	237	436	107
Sample-3	Pond-5	341	748	348	320	381	438	699	1590	540	480	367	310
	Pond-6	249	347	411	390	378	421	271	895	419	377	471	295
Sample-4	Pond-7	360	788	292	611	114	407	210	512	167	312	318	438

Table-97
Monthly abundance of *Filina* in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	207	546	1054	545	507	236	295	215	291	220	105	114
	Pond-2	237	418	331	401	418	196	211	190	81	86	45	91
Sample-2	Pond-3	790	713	612	698	813	317	882	1056	936	370	913	707
	Pond-4	680	873	877	807	218	784	303	758	317	213	798	691
Sample-3	Pond-5	349	771	191	530	207	175	377	1418	603	295	368	338
	Pond-6	277	703	881	512	498	203	310	738	188	458	201	211
Sample-4	Pond-7	732	352	618	701	266	658	281	591	358	408	313	413

Table-98
Monthly abundance of *Trichocera* in different ponds during April'98-March'99.

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	302	418	618	198	119	303	221	377	189	280	271	200
	Pond-2	228	401	109	201	109	129	205	287	60	180	118	103
Sample-2	Pond-3	430	2090	830	633	350	299	438	518	648	380	630	410
	Pond-4	291	318	307	401	191	419	433	693	318	121	270	192
Sample-3	Pond-5	480	419	451	456	356	167	333	872	438	497	448	296
	Pond-6	189	408	417	321	298	183	203	509	508	351	338	281
Sample-4	Pond-7	488	439	283	290	90	537	213	580	111	240	310	472

Table-99
Monthly abundance of *Trichocera* in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	152	849	231	256	140	159	177	163	208	180	259	165
	Pond-2	130	903	135	186	190	103	130	109	113	107	117	99
Sample-2	Pond-3	481	433	508	570	408	238	694	1384	438	240	378	531
	Pond-4	477	794	281	203	210	437	183	690	197	217	317	417
Sample-3	Pond-5	409	618	230	490	174	119	428	836	507	302	381	303
	Pond-6	210	611	690	508	311	160	418	398	219	437	290	110
Sample-4	Pond-7	408	432	303	355	201	612	273	488	337	479	298	499

Table-100
Monthly abundance of *Notholca* in different ponds during April'99-March, 2000.

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	218	299	107	109	19	386	237	781	117	312	280	159
	Pond-2	191	307	85	73	48	108	195	411	47	203	95	79
Sample-2	Pond-3	408	51	130	300	30	371	480	1839	550	437	630	383
	Pond-4	180	257	111	170	97	386	236	737	133	243	117	212
Sample-3	Pond-5	207	803	520	448	287	61	437	850	780	403	437	282
	Pond-6	399	714	613	417	474	301	537	760	225	388	248	212
Sample-4	Pond-7	527	813	268	390	74	518	234	638	120	220	272	388

Table-101
Monthly abundance of *Notholca* in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	158	18	91	111	13	221	201	590	180	205	280	141
	Pond-2	170	31	39	139	36	340	297	388	97	129	109	103
Sample-2	Pond-3	295	481	570	411	301	220	748	811	110	230	1135	490
	Pond-4	531	703	113	76	41	211	198	773	213	209	213	433
Sample-3	Pond-5	517	719	220	480	317	117	539	862	531	236	260	281
	Pond-6	374	513	367	310	279	42	209	836	321	290	398	237
Sample-4	Pond-7	798	503	432	488	199	408	202	512	288	349	212	368

Table-102
Monthly abundance of *Polyarthra* in different ponds during April'98-March'99.

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	250	317	17	71	137	401	203	503	238	180	125	109
	Pond-2	216	295	61	60	180	129	201	256	131	105	95	41
Sample-2	Pond-3	370	403	6	200	328	385	400	1380	650	330	310	280
	Pond-4	372	319	91	98	237	211	186	280	286	290	107	218
Sample-3	Pond-5	336	490	311	268	238	256	417	587	433	389	282	211
	Pond-6	219	312	310	273	285	249	201	533	348	237	357	212
Sample-4	Pond-7	311	529	113	365	90	429	95	588	101	117	195	168

Table-103
Monthly abundance of *Polyarthra* in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	109	151	7	65	130	240	155	491	189	151	131	103
	Pond-2	139	240	11	103	211	103	186	271	63	96	90	76
Sample-2	Pond-3	233	138	190	235	88	115	430	788	133	190	125	181
	Pond-4	117	256	34	65	93	177	167	301	178	177	76	102
Sample-3	Pond-5	336	499	240	356	235	95	312	591	517	217	242	186
	Pond-6	290	490	488	377	370	195	321	478	229	371	291	190
Sample-4	Pond-7	498	290	401	431	195	403	188	498	230	333	208	308

Table-104
Monthly abundance of *Horaella* in different ponds during April'98-March'99

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	190	213	11	19	219	307	161	200	290	580	161	100
	Pond-2	209	270	30	39	233	181	179	109	107	390	103	53
Sample-2	Pond-3	265	161	8	4	520	311	329	373	701	980	440	210
	Pond-4	313	635	176	190	403	286	231	176	98	987	292	176
Sample-3	Pond-5	318	367	298	285	190	137	285	489	387	418	396	181
	Pond-6	270	298	317	237	265	166	160	480	366	230	203	190
Sample-4	Pond-7	313	465	208	213	85	278	213	307	89	219	201	156

Table-105
Monthly abundance of *Horaella* in different ponds during April'99-March, 2000

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	98	51	5	3	209	187	130	108	241	480	181	85
	Pond-2	107	27	9	17	157	201	211	203	108	241	79	56
Sample-2	Pond-3	290	88	127	378	110	90	312	412	340	318	248	133
	Pond-4	101	286	26	141	235	203	210	218	265	519	71	99
Sample-3	Pond-5	308	417	193	413	281	88	295	477	360	187	287	188
	Pond-6	247	413	533	392	312	274	289	347	188	338	203	183
Sample-4	Pond-7	353	301	298	278	133	437	153	377	209	353	195	311

Table-106
Monthly abundance of *Lepadella* in different ponds during April'98-March'99

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	138	178	133	61	23	28	109	289	399	301	150	98
	Pond-2	193	151	83	80	29	37	139	136	299	135	112	40
Sample-2	Pond-3	180	203	210	157	33	8	254	603	713	430	370	210
	Pond-4	121	237	217	130	111	171	207	392	379	237	318	86
Sample-3	Pond-5	93	132	81	86	91	29	131	230	112	130	90	90
	Pond-6	90	70	110	108	95	25	74	198	90	70	95	95
Sample-4	Pond-7	90	170	90	66	59	76	92	81	79	97	77	68

Table-107
Monthly abundance of *Lepadella* in different ponds during April'99-March'99

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January'2000 (individual/liter)	February'2000 (individual/liter)	March'2000 (individual/liter)
Sample-1	Pond-1	55	81	102	57	17	5	99	188	243	209	151	80
	Pond-2	27	63	72	93	29	11	67	91	119	118	101	37
Sample-2	Pond-3	168	135	130	230	148	131	203	348	211	356	291	190
	Pond-4	117	181	116	183	65	148	113	203	209	180	138	103
Sample-3	Pond-5	77	219	99	235	77	87	70	233	88	77	97	90
	Pond-6	95	213	238	201	250	58	77	90	85	155	99	110
Sample-4	Pond-7	101	77	95	65	51	50	77	91	88	97	70	54

Table-108
Monthly abundance of *Notomata* in different ponds during April'98-March'99

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	192	218	107	21	27	31	187	70	173	30	123	240
	Pond-2	217	291	52	25	35	41	217	45	75	97	73	110
Sample-2	Pond-3	230	160	165	180	20	8	317	180	375	61	350	524
	Pond-4	278	318	371	99	30	242	330	113	110	117	216	210
Sample-3	Pond-5	523	766	511	480	236	21	381	1086	814	348	213	396
	Pond-6	280	431	395	331	308	21	310	843	308	298	311	333
Sample-4	Pond-7	511	836	265	319	108	413	255	438	134	310	256	181

Table-109
Monthly abundance of *Notomata* in different ponds during April'99-March, 2000

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	76	66	89	8	11	8	130	55	140	40	141	201
	Pond-2	89	77	49	18	17	3	211	37	137	17	109	100
Sample-2	Pond-3	438	401	445	420	156	256	612	910	503	178	612	678
	Pond-4	413	513	77	418	47	391	127	448	165	65	101	418
Sample-3	Pond-5	523	766	511	480	236	21	381	1086	814	348	231	396
	Pond-6	299	674	703	412	403	288	503	710	157	380	158	87
Sample-4	Pond-7	790	480	418	520	259	413	313	573	343	312	213	297

Table-110
Monthly abundance of *Cyrtonia* in different ponds during April'98-March'99.

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	309	369	9	70	99	13	280	180	190	52	20	60
	Pond-2	270	319	18	91	117	38	205	85	137	61	37	60
Sample-2	Pond-3	410	8	13	190	270	10	458	515	490	70	18	130
	Pond-4	318	351	85	326	90	138	112	258	238	76	207	73
Sample-3	Pond-5	286	398	230	283	238	95	287	613	487	380	248	230
	Pond-6	197	256	342	239	266	111	170	637	417	265	398	237
Sample-4	Pond-7	238	482	210	190	88	313	237	333	81	188	217	378

Table-111
Monthly abundance of *Cyrtonia* in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	155	330	11	81	111	9	198	162	141	27	7	41
	Pond-2	103	431	8	107	135	20	203	90	153	39	13	20
Sample-2	Pond-3	478	371	290	603	90	372	408	253	417	186	434	382
	Pond-4	271	634	35	587	123	418	217	684	137	71	67	281
Sample-3	Pond-5	266	536	207	379	181	89	258	537	387	213	248	238
	Pond-6	211	518	605	384	313	163	278	532	195	314	288	110
Sample-4	Pond-7	418	213	231	313	166	498	188	398	219	337	203	313

Table-112
Monthly abundance of *Asplancha* in different ponds during April'98-March'99

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	17	49	103	91	130	25	19	21	187	180	95	81
	Pond-2	207	80	43	67	148	61	39	39	117	135	81	42
Sample-2	Pond-3	30	245	380	285	31	28	18	14	200	267	210	140
	Pond-4	286	211	476	336	78	100	76	233	386	198	111	101
Sample-3	Pond-5	117	71	117	138	90	91	99	130	90	250	186	90
	Pond-6	25	70	174	97	107	160	56	103	243	103	155	108
Sample-4	Pond-7	109	71	90	61	67	117	95	180	77	95	67	111

Table-113
Monthly abundance of *Asplancha* in different ponds during April'99-March, 2000

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	11	81	209	91	131	21	7	5	55	144	79	41
	Pond-2	17	98	98	46	191	15	13	8	41	153	86	38
Sample-2	Pond-3	293	150	110	429	398	301	239	836	238	311	533	290
	Pond-4	81	211	311	130	108	203	37	317	38	130	417	110
Sample-3	Pond-5	77	290	95	271	47	80	86	136	55	67	87	93
	Pond-6	72	201	295	217	256	38	79	90	88	184	190	17
Sample-4	Pond-7	66	111	77	57	60	60	77	66	61	197	55	190

Table-114
Monthly abundance of *Brachionus* in different ponds during April'98-March'99

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	225	171	570	265	218	611	503	417	709	392	625	670
	Pond-2	366	689	61	126	234	507	112	307	176	75	351	294
Sample-2	Pond-3	744	926	480	410	420	840	984	1103	1495	718	1310	1341
	Pond-4	1055	2215	1023	1833	245	325	624	818	520	538	1211	1151
Sample-3	Pond-5	487	649	592	463	406	317	395	809	527	494	538	516
	Pond-6	574	664	748	406	482	278	437	776	609	470	476	406
Sample-4	Pond-7	513	544	459	1078	306	528	404	548	501	456	811	562

Table-115
Monthly abundance of *Brachionus* in different ponds during April'99-March, 2000

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	317	397	207	138	201	518	367	407	190	539	813	400
	Pond-2	314	413	175	184	318	248	386	521	456	398	216	501
Sample-2	Pond-3	770	583	378	394	533	862	714	1003	870	463	779	641
	Pond-4	649	852	638	1550	511	997	395	629	720	377	854	838
Sample-3	Pond-5	602	511	449	203	197	290	567	1122	983	784	511	638
	Pond-6	546	730	622	469	567	360	441	645	542	617	983	566
Sample-4	Pond-7	614	606	1266	897	424	665	680	670	728	644	950	634

Table-116
Monthly abundance of Cladocera in different ponds during April'98-March'99.

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	1033	1318	1913	1613	1836	978	2378	2419	3031	3013	2630	1533
	Pond-2	965	1501	2187	1611	2050	1037	2178	2600	2435	3213	2518	1418
Sample-2	Pond-3	2815	2200	3500	4800	3715	3080	2107	2530	4100	3303	3500	3100
	Pond-4	2137	2109	3866	1429	2177	1288	2909	2637	4933	2199	2900	2050
Sample-3	Pond-5	2045	1803	2800	3910	3080	1655	1603	2053	3773	3105	3433	3605
	Pond-6	2133	2130	3605	3633	1963	1313	1918	2536	2108	1830	2857	2833
Sample-4	Pond-7	2712	1718	3912	1012	2318	2118	2930	2166	6108	3056	4112	2213

Table-117
Percentage of Cladocera in different ponds during April'98-March'99.

Sample	Pond	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Sample-1	Pond-1	11.43	11.86	16.06	15.57	14.91	8.78	24.16	18.46	26.81	27.71	22.85	14.08
	Pond-2	10.96	13.88	20.82	17.25	17.40	10.05	22.34	22.37	23.75	28.33	24.86	14.45
Sample-2	Pond-3	16.62	9.68	14.39	24.72	27.61	19.27	14.25	12.56	22.79	22.47	24.62	19.07
	Pond-4	13.49	10.18	17.97	8.25	16.47	10.63	24.67	14.82	34.96	20.90	22.09	15.48
Sample-3	Pond-5	13.76	9.84	14.09	24.79	26.71	15.84	13.65	10.90	23.03	20.59	25.23	23.55
	Pond-6	15.72	13.17	21.31	27.27	21.33	16.18	21.28	17.07	22.75	16.60	24.18	20.33
Sample-4	Pond-7	14.46	8.53	19.57	5.38	23.52	11.75	20.72	14.35	37.34	20.13	24.43	11.99

Table-118
Monthly abundance of Cladocera in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	1217	1610	1633	1312	1543	903	1813	1618	1830	2018	2033	1108
	Pond-2	835	1713	1513	1630	1910	1108	2830	2213	1835	1310	2503	1156
Sample-2	Pond-3	1963	2007	3137	5633	3618	3118	2930	3031	4912	3018	3712	3008
	Pond-4	2662	1537	4118	721	2030	1819	2603	2083	5117	2799	3548	2018
Sample-3	Pond-5	2237	2418	3133	4130	3671	1913	2631	2631	4133	3413	2927	3833
	Pond-6	2718	2526	3918	3218	1708	1818	2118	1903	4380	2513	3230	2518
Sample-4	Pond-7	2015	2513	3127	2318	2308	2031	3033	3418	5729	3311	4118	2537

Table-123

Monthly abundance of *Bosmina* in different ponds during April'99-March, 2000

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	559	660	270	279	271	357	350	518	603	360	247	255
	Pond-2	380	792	102	406	480	273	533	933	633	201	384	120
Sample-2	Pond-3	578	213	836	1730	930	731	643	690	1613	756	738	812
	Pond-4	670	407	1518	167	712	312	749	573	1943	743	1000	655
Sample-3	Pond-5	736	786	830	1103	968	467	912	848	1033	1057	836	1030
	Pond-6	850	840	988	412	533	612	708	495	856	603	938	576
Sample-4	Pond-7	828	898	933	749	730	808	918	947	980	947	1073	813

Table-124

Monthly abundance of *Moina* in different ponds during April'98-March'99

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	206	250	459	419	403	127	806	411	313	873	1075	199
	Pond-2	137	279	533	463	435	131	556	350	356	930	778	213
Sample-2	Pond-3	603	481	921	1386	817	491	708	480	491	928	1387	508
	Pond-4	377	583	743	483	329	233	613	410	486	613	830	313
Sample-3	Pond-5	350	391	487	873	581	290	256	490	887	803	895	801
	Pond-6	470	417	830	812	370	180	288	530	830	418	303	717
Sample-4	Pond-7	412	298	836	211	355	488	518	205	1237	887	912	418

Table-125
Monthly abundance of *Moina* in different ponds during April'99-March, 2000

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	269	330	409	368	320	149	590	307	201	560	792	177
	Pond-2	146	370	380	510	513	226	732	508	208	433	630	283
Sample-2	Pond-3	390	318	339	1312	731	438	478	333	833	430	533	277
	Pond-4	348	372	613	178	354	353	547	312	1065	412	843	432
Sample-3	Pond-5	348	412	567	1030	880	382	581	412	987	917	412	917
	Pond-6	487	408	998	510	298	213	327	312	1012	568	787	633
Sample-4	Pond-7	367	537	784	418	403	390	751	884	1170	884	980	387

Table-126
Monthly abundance of *Sida* in different ponds during April'98-March'99

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	113	6	306	241	477	166	118	217	330	361	420	168
	Pond-2	135	39	347	207	503	150	119	218	126	234	430	150
Sample-2	Pond-3	352	6	650	836	938	580	75	218	408	377	507	290
	Pond-4	237	239	830	177	610	181	137	248	267	210	513	295
Sample-3	Pond-5	44	90	93	126	137	77	123	95	136	120	117	95
	Pond-6	70	98	112	78	68	247	437	586	410	70	410	313
Sample-4	Pond-7	72	68	111	60	60	90	97	77	388	93	80	67

Table-127
Monthly abundance of *Sida* in different ponds during April'99-March, 2000

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	155	4	291	223	401	162	57	133	167	220	285	99
	Pond-2	191	19	336	198	398	201	345	301	401	258	437	201
Sample-2	Pond-3	391	312	348	479	390	403	413	378	429	350	387	354
	Pond-4	312	17	78	69	91	557	178	90	578	298	217	101
Sample-3	Pond-5	77	81	136	167	97	49	93	90	230	98	101	186
	Pond-6	90	37	212	70	72	77	55	77	123	101	103	90
Sample-4	Pond-7	36	86	91	70	77	72	70	90	198	90	181	81

Table-128
Monthly abundance of *Alona* in different ponds during April'98-March'99

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	2	84	338	132	21	11	112	22	25	62	156	125
	Pond-2	15	68	327	111	84	38	37	112	43	87	167	34
Sample-2	Pond-3	26	8	#	411	208	#	38	#	71	138	#	271
	Pond-4	86	181	438	121	91	91	86	90	111	101	261	86
Sample-3	Pond-5	572	408	580	541	571	415	396	350	799	385	530	1614
	Pond-6	464	472	585	620	448	408	547	520	585	394	726	334
Sample-4	Pond-7	618	302	744	335	533	410	566	695	1179	792	684	689

Table-129
Monthly abundance of *Alona* in different ponds during April'99-March, 2000

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	8	26	383	162	121	5	76	7	72	130	39	123
	Pond-2	9	121	299	139	47	98	211	91	63	77	181	139
Sample-2	Pond-3	514	333	514	682	502	313	459	597	697	449	790	431
	Pond-4	178	155	536	107	203	126	212	179	513	203	663	218
Sample-3	Pond-5	416	427	854	842	819	686	264	451	871	499	777	635
	Pond-6	531	530	648	943	594	478	430	581	1356	492	512	470
Sample-4	Pond-7	287	259	453	378	400	224	437	599	817	512	912	519

Table-130
Monthly abundance of *Ostracoda* in different ponds during April'98-March'99

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	1101	907	1131	1237	739	730	787	1033	1781	2201	1371	1537
	Pond-2	1233	1077	1201	1133	787	987	810	987	1818	2188	1280	1487
Sample-2	Pond-3	1880	1100	1050	1320	524	817	908	1327	2300	1300	1100	1550
	Pond-4	1677	1357	1830	1533	630	920	937	1621	1933	1597	1630	1711
Sample-3	Pond-5	1600	700	730	1108	380	530	707	1112	2050	1861	1356	1855
	Pond-6	1558	749	810	811	118	710	1003	536	1553	868	1180	1903
Sample-4	Pond-7	2408	1813	2611	2380	1135	1572	1810	2513	2318	2837	1818	2893

Table-131
Percentage of Ostracoda in different ponds during April'98-March'99.

Sample	Pond	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Sample-1	Pond-1	12.19	8.16	9.49	11.94	6.00	6.55	8.02	7.88	15.75	17.32	11.91	14.12
	Pond-2	14.01	9.96	11.43	12.13	6.68	9.57	8.54	8.49	17.73	19.29	12.64	15.15
Sample-2	Pond-3	11.10	4.84	4.32	6.8	3.19	5.11	6.14	6.56	12.79	8.84	7.74	9.54
	Pond-4	10.59	6.55	8.50	8.85	4.76	7.59	7.94	9.11	13.50	15.18	12.41	12.86
Sample-3	Pond-5	10.76	3.82	3.53	7.02	3.29	5.07	6.03	5.90	12.51	12.34	9.96	12.11
	Pond-6	11.48	4.63	4.78	6.08	1.28	8.75	11.13	3.60	11.37	7.87	9.99	13.65
Sample-4	Pond-7	12.82	9.00	13.06	12.65	11.33	8.71	12.80	16.65	14.17	18.68	10.80	15.60

Table-132
Monthly abundance of Ostracoda in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	1413	1110	1084	1133	933	911	667	968	1318	1288	1508	1127
	Pond-2	1208	920	1086	1230	318	1087	618	756	1518	1531	1418	1033
Sample-2	Pond-3	2181	773	713	2112	618	1033	566	2625	2201	1013	1518	1418
	Pond-4	2316	1709	2330	2179	1003	1348	1730	2171	2239	2733	1531	2737
Sample-3	Pond-5	1932	1113	980	1588	1371	1180	1837	1908	1980	2130	1113	1638
	Pond-6	1897	1130	333	1113	708	1113	2009	1130	2918	1130	1631	2318
Sample-4	Pond-7	3003	2317	3113	3733	1133	1877	2173	3037	3718	3718	2618	3278

Table-133
Percentage of Ostracoda in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Sample-1	Pond-1	17.54	10.31	10.51	12.24	9.21	9.84	7.78	9.59	13.02	13.72	14.24	13.6
	Pond-2	16.82	9.36	10.53	15.15	2.97	11.42	5.99	7.40	16.48	19.12	14.82	12.91
Sample-2	Pond-3	11.83	4.46	3.42	8.87	4.09	5.77	3.02	10.98	14.61	8.80	10.01	10.13
	Pond-4	12.62	8.77	11.82	12.03	10.22	7.87	13.89	14.59	14.21	19.31	9.36	15.09
Sample-3	Pond-5	11.11	5.09	4.63	8.38	9.56	10.18	11.72	9.14	11.17	13.90	8.88	10.92
	Pond-6	11.95	6.59	1.75	7.03	5.98	10.30	16.87	8.62	16.60	7.64	12.60	16.18
Sample-4	Pond-7	14.20	11.52	13.32	16.58	9.79	9.78	14.43	15.41	17.95	18.49	13.78	16.30

Table-134
Monthly abundance of *Cypris* in different ponds during April'98-March'99.

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	924	698	848	1088	561	605	566	795	1317	1628	767	1222
	Pond-2	1036	797	918	1090	618	743	499	695	1401	1543	833	1188
Sample-2	Pond-3	1538	829	756	1130	381	646	629	946	1614	916	970	1080
	Pond-4	1281	991	1427	1187	419	601	379	931	1228	986	837	1303
Sample-3	Pond-5	836	343	410	830	133	257	314	756	836	1150	821	912
	Pond-6	780	436	336	288	37	234	411	211	481	356	410	133
Sample-4	Pond-7	1836	1655	1918	2050	798	973	1650	1950	2267	2110	2230	2531

Table-135
Monthly abundance of *Cypris* in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	1144	833	791	963	671	710	450	696	930	900	751	766
	Pond-2	813	546	812	839	197	733	418	403	1133	999	836	609
Sample-2	Pond-3	1406	233	312	1508	178	418	213	1538	1212	708	921	876
	Pond-4	1586	1143	1633	1576	663	721	1230	1190	1312	1831	948	1457
Sample-3	Pond-5	1213	836	287	836	730	548	1130	930	1180	1233	836	1136
	Pond-6	733	530	110	533	205	498	1230	533	1530	688	382	1118
Sample-4	Pond-7	1672	1173	1972	1637	756	836	1130	1418	1910	1837	1111	1831

Table-136
Monthly abundance of *Heterocypris* in different ponds during April'98-March'99.

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	177	209	283	149	178	125	221	238	464	573	604	415
	Pond-2	395	374	274	391	121	354	200	353	385	532	582	424
Sample-2	Pond-3	342	271	294	190	143	171	279	381	660	384	530	470
	Pond-4	730	566	697	603	340	627	500	981	927	902	583	1280
Sample-3	Pond-5	764	357	320	278	247	273	393	356	1214	711	535	943
	Pond-6	778	313	474	523	61	476	592	325	1072	512	770	1170
Sample-4	Pond-7	736	640	639	743	379	736	680	1095	408	1000	707	1062

Table-137
Monthly abundance of *Heterocypris* in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	269	278	293	170	262	201	217	272	388	389	757	361
	Pond2	269	278	293	170	262	201	217	272	388	388	757	361
Sample-2	Pond-3	775	540	401	604	440	615	353	1087	989	305	597	542
	Pond-4	396	366	403	346	211	319	558	690	705	611	793	408
Sample-3	Pond-5	719	277	683	752	641	632	707	978	800	897	277	502
	Pond-6	1164	600	229	580	503	615	779	597	1388	442	1249	1200
Sample-4	Pond-7	1167	662	1195	1683	335	909	523	1087	1651	1618	388	747

Table-138
Monthly abundance of Copepoda in different ponds during April'98-March'99.

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	1309	1438	2188	2080	2813	2513	2588	3030	2035	687	1533	2530
	Pond-2	1497	1312	2087	2003	2614	2610	2611	2818	2111	599	1417	2601
Sample-2	Pond-3	3000	3800	4800	5130	4318	4420	4180	6235	1650	384	980	2319
	Pond-4	2933	3330	4109	5930	3365	3088	2880	5735	1733	581	1180	2809
Sample-3	Pond-5	3000	3300	3100	3549	3157	3077	3309	5003	1411	561	1020	2701
	Pond-6	2856	3168	4080	2833	2837	1911	1933	3370	718	630	710	3100
Sample-4	Pond-7	3603	4012	4517	6517	2610	4243	4142	2418	2379	3108	2130	3801

Table-139
Percentage of Copepoda in different ponds during April'98-March'99.

Sample	Pond	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Sample-1	Pond-1	14.49	12.94	18.37	20.08	22.84	22.56	26.37	23.12	18	5.40	13.32	23.25
	Pond-2	17.01	12.13	19.80	21.44	22.18	25.31	27.54	24.25	20.59	5.28	13.99	26.51
Sample-2	Pond-3	17.71	16.71	19.73	26.42	26.27	27.66	28.25	30.96	9.17	2.61	6.89	14.24
	Pond-4	18.52	16.08	19.10	33.10	25.47	25.49	24.43	32.24	12.10	5.53	8.99	21.11
Sample-3	Pond-5	20.18	18.01	15.60	22.50	27.38	29.46	28.19	26.56	8.61	3.72	7.49	17.64
	Pond-6	21.05	19.59	24.12	21.26	30.82	23.56	21.45	22.68	5.25	5.71	6.01	22.24
Sample-4	Pond-7	19.18	19.92	22.59	34.65	26.07	23.72	29.29	15.02	14.54	20.47	12.65	20.50

Table-140
Monthly abundance of Copepoda in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	933	1230	1418	1684	1810	2050	2009	2184	1543	1067	1643	1838
	Pond-2	990	1108	2118	1512	1830	2313	2611	2003	1113	788	1611	2230
Sample-2	Pond-3	2899	2613	4318	5918	4012	4703	5012	6910	1212	826	1130	1013
	Pond-4	3526	3818	4393	6371	2490	4039	3730	2150	2071	2780	1833	3677
Sample-3	Pond-5	3218	3987	3780	4230	3847	2895	4880	4733	1808	881	833	2901
	Pond-6	3890	2218	3172	3130	2213	2213	933	1830	1318	819	1418	3303
Sample-4	Pond-7	4113	4440	5080	5731	2910	4244	4131	3377	3077	3733	2131	4018

Table-141
Percentage of Copepoda in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Sample-1	Pond-1	11.58	11.41	13.75	18.24	17.96	22.15	23.44	21.59	15.24	11.42	15.54	22.18
	Pond-2	13.78	11.27	20.54	18.63	17.08	24.31	25.32	19.61	12.08	9.84	16.83	26.80
Sample-2	Pond-3	15.73	15.07	21.03	24.85	26.56	26.24	26.78	28.90	8.05	7.17	7.45	14.38
	Pond-4	19.21	19.60	22.28	35.22	25.39	23.60	28.66	14.45	13.14	19.64	11.21	20.27
Sample-3	Pond-5	18.51	18.24	17.88	22.32	26.84	24.98	31.13	22.69	10.20	5.75	6.64	19.34
	Pond-6	24.51	12.94	16.67	14.79	18.70	20.45	7.83	13.95	7.49	5.54	10.48	23.08
Sample-4	Pond-7	19.44	22.07	21.74	25.39	25.14	22.12	22.44	17.19	14.44	18.56	11.27	19.97

Table-142
Monthly abundance of *Cyclops* in different ponds during April'98-March'99.

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	142	1078	1615	1643	2194	1838	1915	1969	1607	570	1027	1745
	Pond-2	839	933	1601	1581	1857	1933	2050	2133	1703	331	973	1801
Sample-2	Pond-3	2468	2829	3500	3974	3387	3052	3022	3955	1302	334	649	1540
	Pond-4	1873	2137	2833	2987	3087	2233	2107	3718	1188	221	837	1633
Sample-3	Pond-5	1830	2150	1830	2118	2050	1833	1952	3836	790	286	586	1912
	Pond-6	1414	1957	2230	2130	1738	1610	1117	1377	312	258	311	1833
Sample-4	Pond-7	1930	2610	2930	4080	1830	3810	2830	1890	1630	1833	1677	1971

Table-143
Monthly abundance of *Cyclops* in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	783	922	1006	1340	1420	1490	1500	1415	1230	860	710	1231
	Pond-2	536	801	1590	1170	1231	1837	1913	1373	699	468	897	1533
Sample-2	Pond-3	1937	1833	3471	3733	3111	3218	3638	4040	673	472	588	1113
	Pond-4	2230	2570	3319	4018	1630	2801	2867	1633	1170	1650	1050	2100
Sample-3	Pond-5	1830	2158	2233	2830	1633	1930	2882	2733	958	426	255	1418
	Pond-6	2330	1750	1833	2180	1810	1543	495	1160	720	213	866	1630
Sample-4	Pond-7	2633	3137	4010	4340	1940	3061	2850	1733	1630	2150	1750	1833

Table-144
Monthly abundance of *Diaptomus* in different ponds during April'98-March'99.

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	1167	360	573	437	619	679	673	1061	428	117	506	785
	Pond-2	658	379	479	422	757	677	561	685	404	268	444	800
Sample-2	Pond-3	532	971	1300	1156	931	1368	1158	2300	348	50	331	779
	Pond-4	1060	1193	1276	2743	278	855	773	2017	545	360	343	1176
Sample-3	Pond-5	1170	1150	1270	1430	1107	1244	1352	1167	621	275	434	789
	Pond-6	1442	1211	1850	703	1099	301	816	1993	406	372	409	1267
Sample-4	Pond-7	1673	1402	1582	2437	780	433	1312	528	749	1275	453	1830

Table-145
Monthly abundance of *Diaptomus* in different ponds during April'99-March, 2000.

ample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	150	308	412	344	400	560	509	769	313	207	933	607
	Pond-2	454	307	528	342	599	476	758	630	414	320	720	697
Sample-2	Pond-3	962	780	847	2185	901	1485	1374	2870	539	354	542	900
	Pond-4	1296	1248	1074	2359	860	1238	863	517	910	1130	783	1577
Sample-3	Pond-5	1388	1829	1547	1400	2214	963	1998	2000	850	455	578	1483
	Pond-6	1560	468	1337	950	403	670	438	670	598	606	552	1673
Sample-4	Pond-7	1480	1303	1070	1391	960	1183	1281	1644	1447	1583	381	2183

Table-146
Monthly abundance of Nauplius in different ponds during April'98-March'99.

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	1430	1188	1338	1518	613	2050	913	1003	870	2270	1370	1631
	Pond-2	1318	1233	1226	1417	533	2111	977	977	910	2013	1470	1530
Sample-2	Pond-3	2100	1900	2680	1800	913	1110	1290	540	1108	1803	1480	1603
	Pond-4	2307	2139	3151	1921	733	1910	884	845	911	2137	1590	1788
Sample-3	Pond-5	1315	1200	1705	1403	313	1833	931	411	1703	2103	1840	1933
	Pond-6	1401	1366	1355	1537	112	930	730	320	2103	1338	1330	1508
Sample-4	Pond-7	2856	1703	3732	2612	1072	2768	1718	712	1256	2618	2637	2872

Table-147
Percentage of Nauplius in different ponds during April'98-March'99.

Sample	Pond	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Sample-1	Pond-1	15.83	10.69	11.23	14.65	4.97	18.40	9.30	7.65	7.69	17.86	11.90	14.98
	Pond-2	14.97	11.40	11.67	15.17	4.52	20.47	10.30	8.40	8.87	17.75	14.51	15.69
Sample-2	Pond-3	12.40	8.36	4.01	9.27	5.56	6.95	8.73	2.68	6.16	12.27	10.40	9.86
	Pond-4	14.56	10.33	14.65	11.09	5.54	15.76	7.49	4.76	6.36	20.31	12.11	13.44
Sample-3	Pond-5	8.86	6.55	8.58	8.89	2.71	7.97	7.93	2.18	10.39	13.94	13.52	12.62
	Pond-6	10.32	8.44	8.01	11.53	1.21	11.46	8.10	2.15	15.39	12.14	11.26	10.82
Sample-4	Pond-7	15.20	8.45	18.67	13.89	10.78	15.34	12.14	4.71	7.67	17.24	15.66	15.49

Table-148
Monthly abundance of Nauplius in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	1610	1318	1531	1718	1118	2223	1013	1113	1170	1318	1188	1133
	Pond-2	1312	1133	1516	1317	613	1933	1033	1033	1103	1030	1513	1318
Sample-2	Pond-3	2318	2333	2312	2503	1009	1518	1591	1040	1213	1233	1717	1550
	Pond-4	2809	1591	3505	2397	921	2518	1513	538	1148	2318	2518	2718
Sample-3	Pond-5	1156	1918	2477	2133	4603	1184	1080	831	2330	2680	2130	1630
	Pond-6	1979	1918	1830	1918	1030	1188	1830	580	4280	2056	1837	1730
Sample-4	Pond-7	3018	2059	4018	3610	1072	2910	1718	1639	2618	3177	3163	3131

Table-149
Percentage of Nauplius in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September '99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Sample-1	Pond-1	19.99	12.23	14.84	18.61	11.03	24.02	11.82	11.00	11.56	14.11	11.24	13.57
	Pond-2	18.26	11.53	14.70	16.22	5.72	20.32	10.01	10.12	11.97	12.86	15.81	15.84
Sample-2	Pond-3	12.58	13.45	11.26	10.51	6.68	8.48	8.50	4.35	8.05	10.41	11.32	11.04
	Pond-4	15.30	8.16	17.80	13.24	9.39	14.71	11.62	3.61	7.28	16.37	15.39	14.58
Sample-3	Pond-5	6.6	8.77	11.72	11.25	6.71	10.25	6.89	3.98	13.15	17.49	16.99	10.80
	Pond-6	12.47	11.19	9.62	12.12	8.70	11.00	15.36	4.42	24.35	13.91	13.58	12.08
Sample-4	Pond-7	14.27	10.24	17.19	15.99	9.26	15.17	11.41	8.29	12.29	15.80	16.64	15.56

Table-150
Monthly abundance of Protozoan in different ponds during April'98-March'99.

Sample	Name	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	1314	2517	2913	2548	4723	1680	730	1413	1331	1358	1703	1533
	Pond-2	1170	2188	3030	2018	3927	1530	811	2051	1570	1470	1733	1618
Sample-2	Pond-3	3000	8000	7853	2210	3083	3420	1100	1300	1518	2800	2130	2580
	Pond-4	2811	5842	4659	2331	4103	1820	933	1711	1618	1137	1890	1930
Sample-3	Pond-5	3056	5407	7405	2030	1520	2518	844	1400	1800	2933	2080	2140
	Pond-6	2857	4807	2711	1318	933	1867	933	1100	1900	3133	1888	1833
Sample-4	Pond-7	3112	4683	2508	4033	1613	3012	1133	2303	2613	917	2872	3112

Table-151
Percentage of Protozoan in different ponds during April'98-March'99.

Sample	Pond	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Sample-1	Pond-1	14.55	22.65	24.46	24.60	38.36	15.28	7.44	14.60	11.77	10.68	14.79	14.08
	Pond-2	13.29	20.24	28.85	21.61	33.33	14.83	8.55	17.65	15.31	12.96	17.11	16.49
Sample-2	Pond-3	17.91	35.19	32.29	11.38	18.76	21.40	7.44	6.45	8.44	19.05	14.98	15.88
	Pond-4	17.75	28.11	21.66	13.46	31.05	15.02	7.91	9.61	11.30	10.81	14.04	14.50
Sample-3	Pond-5	20.56	29.51	37.28	12.87	13.18	24.10	7.19	7.43	10.98	19.48	15.27	13.98
	Pond-6	21.06	29.73	16.03	9.89	10.13	23.02	10.35	7.40	13.91	28.43	15.98	13.15
Sample-4	Pond-7	16.57	23.26	12.54	10.28	16.11	16.70	8.01	15.26	15.97	6.04	17.06	16.79

Table-152
Monthly abundance of Protozoan in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	1418	2830	2030	1730	3018	1158	810	1508	1533	984	1512	968
	Pond-2	1317	1911	2879	1033	4113	1613	1013	2112	2110	1610	1310	1110
Sample-2	Pond-3	3298	5543	5808	2280	2207	4146	2285	1148	770	2144	1316	2383
	Pond-4	2868	4561	2367	1803	1469	2921	1071	2111	2353	817	2890	2919
Sample-3	Pond-5	4831	6233	8341	2318	2180	2930	1177	1881	2118	3121	2138	1831
	Pond-6	2857	4807	2711	1318	933	1867	933	1100	1900	3133	1888	1833
Sample-4	Pond-7	3156	4818	3117	2113	1812	3008	1129	3107	3307	2013	3718	3088

Table-153
Percentage of Protozoan in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Sample-1	Pond-1	17.60	26.25	19.68	18.74	29.78	12.05	9.45	14.90	15.14	10.53	14.30	11.67
	Pond-2	18.33	19.43	27.92	12.73	38.39	16.95	9.82	20.68	22.90	20.10	13.79	13.34
Sample-2	Pond-3	17.90	31.96	28.28	9.85	9.58	16.61	23.16	12.21	4.80	5.11	18.63	8.68
	Pond-4	15.62	23.41	12.00	9.95	14.98	17.07	8.23	14.19	14.93	5.77	17.67	16.09
Sample-3	Pond-5	27.7	28.5	39.46	12.29	15.21	25.30	7.51	9.01	11.95	20.37	17.05	12.47
	Pond-6	21.06	29.73	16.03	9.89	10.13	23.02	10.35	7.40	13.91	28.43	15.98	13.15
Sample-4	Pond-7	16.57	23.26	12.54	10.28	16.11	16.70	8.01	15.26	15.97	6.04	17.06	16.79

Table-154
Monthly abundance of others in different ponds during April'98-March'99.

Sample	Pond	April'98 (individual/liter)	May'98 (individual/liter)	June'98 (individual/liter)	July'98 (individual/liter)	August'98 (individual/liter)	September'98 (individual/liter)	October'98 (individual/liter)	November'98 (individual/liter)	December'98 (individual/liter)	January'99 (individual/liter)	February'99 (individual/liter)	March'99 (individual/liter)
Sample-1	Pond-1	40	49	50	37	39	21	97	38	31	48	41	48
	Pond-2	31	38	43	47	40	38	101	37	33	39	41	40
Sample-2	Pond-3	60	55	140	30	81	33	117	29	11	--	50	83
	Pond-4	77	51	74	37	103	17	108	37	18	33	57	71
Sample-3	Pond-5	36	80	140	40	80	31	101	42	37	39	51	80
	Pond-6	38	67	1307	28	58	18	51	19	28	80	41	57
Sample-4	Pond-7	101	78	89	63	79	92	79	93	85	39	110	93

Table-155
Percentage of others in different ponds during April'98-March'99.

Sample	Pond	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Sample-1	Pond-1	31.04	33.24	19.94	12.77	12.57	28.42	23.69	27.97	19.66	24.66	24.86	20.85
	Pond-2	.35	.35	.40	.50	.33	.36	1.06	.31	.32	.34	.40	.40
Sample-2	Pond-3	.35	.24	.58	.15	.49	.21	.79	.14	.061	--	.35	.51
	Pond-4	.48	.24	.36	.21	.77	.14	.91	.20	.12	.31	.43	.53
Sample-3	Pond-5	.24	.43	.70	.25	.69	.29	.86	.22	.22	.25	.37	.52
	Pond-6	.28	.41	.81	.21	.63	.22	1.00	.12	.20	.72	.34	.40
Sample-4	Pond-7	.53	.38	.46	.33	.78	.51	.55	.61	.51	.25	.65	.50

Table-156
Monthly abundance of others in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (individual/liter)	May'99 (individual/liter)	June'99 (individual/liter)	July'99 (individual/liter)	August'99 (individual/liter)	September'99 (individual/liter)	October'99 (individual/liter)	November'99 (individual/liter)	December'99 (individual/liter)	January, 2000 (individual/liter)	February, 2000 (individual/liter)	March, 2000 (individual/liter)
Sample-1	Pond-1	81	77	43	52	43	37	58	43	72	79	87	43
	Pond-2	41	32	81	82	43	41	79	39	31	53	19	43
Sample-2	Pond-3	58	69	177	57	111	75	157	37	39	8	59	117
	Pond-4	91	73	83	53	73	89	117	83	78	18	103	89
Sample-3	Pond-5	71	83	111	69	77	67	731	87	80	71	67	74
	Pond-6	59	103	111	81	87	89	101	78	49	71	65	78
Sample-4	Pond-7	101	98	81	59	98	81	127	89	119	78	111	137

Table-157
Percentage of others in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Sample-1	Pond-1	1.00	.7	.41	.56	.42	.4	.68	.42	.71	.85	.82	.52
	Pond-2	.57	.33	.78	1.01	.40	.43	.77	.38	.34	.66	.20	.52
Sample-2	Pond-3	.31	.40	.86	.24	.73	.82	.84	.15	.25	.07	.39	.85
	Pond-4	.49	.37	.42	.29	.74	.52	.89	.55	.49	.12	.62	.49
Sample-3	Pond-5	.40	.37	.52	.36	.53	.57	.83	.41	.47	.46	.53	.49
	Pond-6	.37	.60	.58	.51	.73	.82	.84	.55	.27	.48	.48	.54
Sample-4	Pond-7	.48	.49	.35	.26	.85	.42	.84	.45	.56	.39	.58	.68

Table-158
Monthly fluctuations of Oligochaeta in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter^2)	May'98 (individual/meter^2)	June'98 (individual/meter^2)	July'98 (individual/meter^2)	August'98 (individual/meter^2)	September'98 (individual/meter^2)	October'98 (individual/meter^2)	November'98 (individual/meter^2)	December'98 (individual/meter^2)	January'99 (individual/meter^2)	February'99 (individual/meter^2)	March'99 (individual/meter^2)
Sample-1	Pond-1	1233	1435	1509	836	1121	1370	1563	1727	729	1303	940	1044
	Pond-2	1300	1000	544	505	862	1494	1160	910	447	1002	1183	952
Sample-2	Pond-3	2100	3810	3600	1424	925	2100	1748	3100	5600	4108	4803	3400
	Pond-4	2533	2926	2638	513	428	1848	1127	2454	5608	4367	3535	2279
Sample-3	Pond-5	1851	2204	2542	985	837	1460	1322	1486	3549	3395	3922	2704
	Pond-6	1220	2038	2544	906	954	1197	1181	1108	2932	2741	2643	1739
Sample-4	Pond-7	3814	3387	3362	1332	1240	2715	2221	1935	3950	4200	3607	3551

Table-159
Percentage of Oligochaeta of different ponds in April'98-March'99.

Sample	Pond	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Sample-1	Pond-1	40.85	57.10	50.00	31.90	50.80	45.21	55.21	68.58	34.40	55.85	38.55	43.06
	Pond-2	46.14	45.12	23.4	23.85	39.70	53.20	43.25	39.77	47.87	49.8	55.77	45.13
Sample-2	Pond-3	31.47	65.3	61.07	47.51	45.37	55.29	69.53	65.23	65.00	62.42	69.74	55.97
	Pond-4	40.09	53.48	51.64	18.16	23.60	55.47	52.80	56.43	69.67	70.96	59.10	41.30
Sample-3	Pond-5	35.02	43.79	61.66	39.13	41.06	31.90	59.60	36.19	63.94	65.82	67.23	48.99
	Pond-6	24.97	46.76	63.31	37.08	35.93	47.67	58.23	28.87	56.67	56.48	60.96	40.36
Sample-4	Pond-7	47.85	48.37	59.70	34.71	42.34	54.21	63.16	50.05	58.40	71.78	55.18	51.67

Table-160
Monthly fluctuations of Oligochaeta in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter^2)	May'99 (individual/meter^2)	June'99 (individual/meter^2)	July'99 (individual/meter^2)	August'99 (individual/meter^2)	September'99 (individual/meter^2)	October'99 (individual/meter^2)	November'99 (individual/meter^2)	December'99 (individual/meter^2)	January, 2000 (individual/meter^2)	February, 2000 (individual/meter^2)	March, 2000 (individual/meter^2)
Sample-1	Pond-1	925	1136	1102	840	964	1132	1279	1500	707	1280	886	815
	Pond-2	1506	1004	704	488	1037	1615	867	958	1107	1224	1076	1321
Sample-2	Pond-3	2350	3515	3312	2564	1982	1049	1030	3159	3939	4443	4015	3313
	Pond-4	3122	3226	3179	933	1172	2856	2156	2087	4011	3587	3511	3057
Sample-3	Pond-5	1631	1840	2385	1133	552	1150	994	988	3058	2900	1837	1953
	Pond-6	1505	2163	2039	855	953	1434	768	987	2327	1987	2577	1119
Sample-4	Pond-7	3597	3230	2933	815	1611	1332	2300	2145	4865	3379	2379	3865

Table-161
Percentage of Oligochaeta in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Sample-1	Pond-1	36.47	49.13	40.3	34.74	47.4	43.3	50.8	62.8	39.08	59.07	38.2	34.16
	Pond-2	51.79	41.54	31.00	20.50	43.23	50.8	34.86	40.71	54.4	49.4	45.8	54.32
Sample-2	Pond-3	33.3	57.50	48.47	57.85	51.67	45.39	50.09	61.27	57.64	60.28	53.10	57.03
	Pond-4	43.50	48.02	59.38	28.86	43.12	59.27	65.20	55.59	62.32	70.15	55.56	49.16
Sample-3	Pond-5	33.21	38.93	60.05	44.31	28.78	45.63	48.80	25.03	67.13	57.77	40.63	37.35
	Pond-6	29.41	43.40	52.42	30.46	38.51	51.42	40.92	17.16	47.81	44.09	64.12	26.50
Sample-4	Pond-7	39.93	39.50	45.54	19.86	35.36	37.20	53.27	42.24	68.23	63.31	42.15	47.67

Table-162
Monthly fluctuations of *Tubifex* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter^2)	May'98 (individual/meter^2)	June'98 (individual/meter^2)	July'98 (individual/meter^2)	August'98 (individual/meter^2)	September'98 (individual/meter^2)	October'98 (individual/meter^2)	November'98 (individual/meter^2)	December'98 (individual/meter^2)	January'99 (individual/meter^2)	February'99 (individual/meter^2)	March'99 (individual/meter^2)
Sample-1	Pond-1	44	36	140	310	35	55	40	5	3	5	3	2
	Pond-2	51	22	51	180	21	71	27	4	2	9	7	5
Sample-2	Pond-3	81	77	344	540	28	95	51	8	25	18	12	5
	Pond-4	736	701	697	261	130	310	85	186	836	773	710	715
Sample-3	Pond-5	50	538	317	15	7	41	26	38	411	498	538	266
	Pond-6	21	498	298	5	75	13	15	9	312	290	250	48
Sample-4	Pond-7	479	512	498	112	98	419	508	479	488	579	483	401

Table-163
Monthly fluctuations of *Tubifex* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter²)	May'99 (individual/meter²)	June'99 (individual/meter²)	July'99 (individual/meter²)	August'99 (individual/meter²)	September'99 (individual/meter²)	October'99 (individual/meter²)	November'99 (individual/meter²)	December'99 (individual/meter²)	January, 2000 (individual/meter²)	February, 2000 (individual/meter²)	March, 2000 (individual/meter²)
Sample-1	Pond-1	37	23	100	311	38	46	25	14	5	13	7	8
	Pond-2	41	18	81	151	47	29	14	7	11	26	11	17
Sample-2	Pond-3	418	813	733	612	290	245	160	728	813	936	830	790
	Pond-4	113	217	207	87	17	101	36	436	931	982	837	418
Sample-3	Pond-5	49	380	631	101	38	90	77	70	340	310	51	312
	Pond-6	40	512	309	91	70	38	58	91	603	488	639	95
Sample-4	Pond-7	409	433	366	136	312	408	537	398	612	418	403	517

Table-164
Monthly fluctuations of *Dero* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter²)	May'98 (individual/meter²)	June'98 (individual/meter²)	July'98 (individual/meter²)	August'98 (individual/meter²)	September'98 (individual/meter²)	October'98 (individual/meter²)	November'98 (individual/meter²)	December'98 (individual/meter²)	January'99 (individual/meter²)	February'99 (individual/meter²)	March'99 (individual/meter²)
Sample-1	Pond-1	68	87	220	110	17	14	345	110	22	40	30	42
	Pond-2	79	101	83	75	5	27	211	71	32	37	35	49
Sample-2	Pond-3	111	242	518	195	13	28	389	191	218	126	178	138
	Pond-4	129	372	383	78	8	91	313	248	738	731	428	171
Sample-3	Pond-5	80	319	417	71	60	61	49	65	380	403	330	245
	Pond-6	37	390	403	68	60	37	40	27	417	356	412	77
Sample-4	Pond-7	381	317	258	121	101	418	407	237	391	481	418	398

Table-165
Monthly fluctuations of *Dero* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter^2)	May'99 (individual/meter^2)	June'99 (individual/meter^2)	July'99 (individual/meter^2)	August'99 (individual/meter^2)	September'99 (individual/meter^2)	October'99 (individual/meter^2)	November'99 (individual/meter^2)	December'99 (individual/meter^2)	January, 2000 (individual/meter^2)	February, 2000 (individual/meter^2)	March, 2000 (individual/meter^2)
Sample-1	Pond-1	57	74	155	110	9	15	281	98	16	35	20	30
	Pond-2	63	61	67	46	19	71	203	71	27	41	31	81
Sample-2	Pond-3	309	558	419	380	185	113	26	425	529	639	500	538
	Pond-4	445	512	487	91	11	401	312	270	512	498	418	417
Sample-3	Pond-5	71	395	430	70	39	71	120	137	460	415	81	208
	Pond-6	67	377	418	77	65	55	60	70	418	403	410	67
Sample-4	Pond-7	372	301	345	83	117	157	383	283	738	369	313	328

Table-166
Monthly fluctuations of *Nais* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter^2)	May'98 (individual/meter^2)	June'98 (individual/meter^2)	July'98 (individual/meter^2)	August'98 (individual/meter^2)	September'98 (individual/meter^2)	October'98 (individual/meter^2)	November'98 (individual/meter^2)	December'98 (individual/meter^2)	January'99 (individual/meter^2)	February'99 (individual/meter^2)	March'99 (individual/meter^2)
Sample-1	Pond-1	63	5	20	76	11	17	19	21	4	5	5	3
	Pond-2	83	11	8	49	7	38	31	38	14	11	11	13
Sample-2	Pond-3	108	8	39	138	18	29	19	39	20	13	19	8
	Pond-4	194	73	78	90	11	63	71	382	703	536	182	279
Sample-3	Pond-5	110	290	211	22	21	25	23	90	260	268	257	230
	Pond-6	19	270	201	19	25	11	17	11	258	312	308	101
Sample-4	Pond-7	270	268	328	117	95	236	272	90	257	387	317	307

Table-167
Monthly fluctuations of *Nais* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter²)	May'99 (individual/meter²)	June'99 (individual/meter²)	July'99 (individual/meter²)	August'99 (individual/meter²)	September'99 (individual/meter²)	October'99 (individual/meter²)	November'99 (individual/meter²)	December'99 (individual/meter²)	January, 2000 (individual/meter²)	February, 2000 (individual/meter²)	March, 2000 (individual/meter²)
Sample-1	Pond-1	77	12	17	76	7	11	13	13	6	14	6	5
	Pond-2	91	27	31	45	16	19	21	21	9	21	11	29
Sample-2	Pond-3	214	413	353	92	165	160	48	370	448	578	403	390
	Pond-4	381	317	378	137	27	302	76	137	418	379	349	318
Sample-3	Pond-5	93	170	297	108	17	88	29	31	261	250	120	297
	Pond-6	87	281	251	35	17	77	21	35	281	185	312	81
Sample-4	Pond-7	258	237	239	57	83	73	258	191	357	479	228	221

Table-168
Monthly fluctuations of *Mesenchytrachus* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter²)	May'98 (individual/meter²)	June'98 (individual/meter²)	July'98 (individual/meter²)	August'98 (individual/meter²)	September'98 (individual/meter²)	October'98 (individual/meter²)	November'98 (individual/meter²)	December'98 (individual/meter²)	January'99 (individual/meter²)	February'99 (individual/meter²)	March'99 (individual/meter²)
Sample-1	Pond-1	8	51	15	45	10	85	150	3	8	10	4	3
	Pond-2	13	67	11	38	7	77	225	13	18	7	13	8
Sample-2	Pond-3	12	136	48	79	8	138	29	3	53	29	18	70
	Pond-4	48	250	113	63	17	190	161	36	276	448	73	331
Sample-3	Pond-5	49	168	101	36	20	63	35	13	37	81	83	87
	Pond-6	23	138	95	25	22	26	29	35	115	180	211	37
Sample-4	Pond-7	47	70	111	151	130	101	112	130	84	111	67	105

Table-169
Monthly fluctuations of *Mesenchytrachus* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter^2)	May'99 (individual/meter^2)	June'99 (individual/meter^2)	July'99 (individual/meter^2)	August'99 (individual/meter^2)	September'99 (individual/meter^2)	October'99 (individual/meter^2)	November'99 (individual/meter^2)	December'99 (individual/meter^2)	January, 2000 (individual/meter^2)	February, 2000 (individual/meter^2)	March, 2000 (individual/meter^2)
Sample-1	Pond-1	4	35	11	43	10	68	10	14	5	10	8	7
	Pond-2	9	41	19	21	23	51	9	28	13	17	18	37
Sample-2	Pond-3	93	195	277	120	70	101	30	177	233	240	203	295
	Pond-4	186	210	197	87	18	211	117	34	210	237	236	168
Sample-3	Pond-5	11	115	273	67	11	63	22	28	121	110	49	158
	Pond-6	7	165	130	25	19	9	18	25	266	105	165	53
Sample-4	Pond-7	23	46	81	38	101	95	107	75	351	258	81	79

Table-170
Monthly fluctuations of *Aullodrillus* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter^2)	May'98 (individual/meter^2)	June'98 (individual/meter^2)	July'98 (individual/meter^2)	August'98 (individual/meter^2)	September'98 (individual/meter^2)	October'98 (individual/meter^2)	November'98 (individual/meter^2)	December'98 (individual/meter^2)	January'99 (individual/meter^2)	February'99 (individual/meter^2)	March'99 (individual/meter^2)
Sample-1	Pond-1	172	43	31	135	465	7	94	290	110	105	105	42
	Pond-2	137	49	13	66	400	11	48	89	213	118	121	49
Sample-2	Pond-3	290	121	95	240	385	10	109	538	936	368	538	149
	Pond-4	303	403	419	12	81	783	324	233	836	430	487	483
Sample-3	Pond-5	312	197	281	111	76	258	279	231	412	257	356	352
	Pond-6	208	170	241	95	66	211	217	170	312	280	170	278
Sample-4	Pond-7	412	278	210	173	179	238	151	251	509	678	471	418

Table-171
Monthly fluctuations of *Aullodrillus* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter²)	May'99 (individual/meter²)	June'99 (individual/meter²)	July'99 (individual/meter²)	August'99 (individual/meter²)	September'99 (individual/meter²)	October'99 (individual/meter²)	November'99 (individual/meter²)	December'99 (individual/meter²)	January, 2000 (individual/meter²)	February, 2000 (individual/meter²)	March, 2000 (individual/meter²)
Sample-1	Pond-1	140	35	23	142	390	12	77	255	106	102	98	21
	Pond-2	210	27	53	110	318	181	61	137	198	137	121	53
Sample-2	Pond-3	70	73	181	190	203	115	188	101	211	312	215	213
	Pond-4	110	78	111	67	310	86	183	218	273	186	170	152
Sample-3	Pond-5	248	280	119	112	39	110	77	17	348	308	286	186
	Pond-6	213	188	210	71	66	157	55	70	112	265	185	108
Sample-4	Pond-7	398	203	312	79	141	131	167	212	408	169	137	320

Table-172
Monthly fluctuations of *Branchiura* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter²)	May'98 (individual/meter²)	June'98 (individual/meter²)	July'98 (individual/meter²)	August'98 (individual/meter²)	September'98 (individual/meter²)	October'98 (individual/meter²)	November'98 (individual/meter²)	December'98 (individual/meter²)	January'99 (individual/meter²)	February'99 (individual/meter²)	March'99 (individual/meter²)
Sample-1	Pond-1	530	18	5	4	170	110	48	330	145	143	178	470
	Pond-2	520	29	3	3	101	287	21	275	281	203	230	312
Sample-2	Pond-3	890	72	8	6	144	176	69	612	1144	47	918	1540
	Pond-4	1081	79	183	17	120	301	38	190	489	183	278	118
Sample-3	Pond-5	480	101	276	148	95	247	228	487	810	530	478	367
	Pond-6	207	90	250	120	25	170	185	233	213	307	256	595
Sample-4	Pond-7	817	517	390	95	135	249	95	95	870	713	867	856

Table-173
Monthly fluctuations of *Branchiura* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter²)	May'99 (individual/meter²)	June'99 (individual/meter²)	July'99 (individual/meter²)	August'99 (individual/meter²)	September'99 (individual/meter²)	October'99 (individual/meter²)	November'99 (individual/meter²)	December'99 (individual/meter²)	January, 2000 (individual/meter²)	February, 2000 (individual/meter²)	March, 2000 (individual/meter²)
Sample-1	Pond-1	398	12	11	9	145	90	39	280	140	113	165	360
	Pond-2	508	19	22	29	200	110	29	181	191	219	224	481
Sample-2	Pond-3	377	379	403	58	390	45	156	402	452	508	413	580
	Pond-4	418	403	372	37	107	378	49	312	483	418	438	398
Sample-3	Pond-5	536	67	136	47	22	47	29	39	265	207	613	108
	Pond-6	500	110	95	35	22	358	31	31	112	70	72	35
Sample-4	Pond-7	749	498	317	86	137	101	75	113	533	191	93	428

Table-174
Monthly fluctuations of *Limnodrillus* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter²)	May'98 (individual/meter²)	June'98 (individual/meter²)	July'98 (individual/meter²)	August'98 (individual/meter²)	September'98 (individual/meter²)	October'98 (individual/meter²)	November'98 (individual/meter²)	December'98 (individual/meter²)	January'99 (individual/meter²)	February'99 (individual/meter²)	March'99 (individual/meter²)
Sample-1	Pond-1	110	506	709	66	360	980	675	69	386	707	275	354
	Pond-2	131	267	272	51	271	818	520	51	324	317	371	418
Sample-2	Pond-3	185	1332	1739	119	294	1513	757	1291	2984	2287	1417	1180
	Pond-4	303	403	419	12	81	783	324	233	836	430	487	483
Sample-3	Pond-5	101	281	438	190	88	450	267	117	358	490	356	412
	Pond-6	410	240	405	85	160	480	460	310	457	503	436	121
Sample-4	Pond-7	378	328	478	110	165	395	238	278	418	438	408	357

Table-175
Monthly fluctuations of *Limnodrillus* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter^2)	May'99 (individual/meter^2)	June'99 (individual/meter^2)	July'99 (individual/meter^2)	August'99 (individual/meter^2)	September'99 (individual/meter^2)	October'99 (individual/meter^2)	November'99 (individual/meter^2)	December'99 (individual/meter^2)	January, 2000 (individual/meter^2)	February, 2000 (individual/meter^2)	March, 2000 (individual/meter^2)
Sample-1	Pond-1	74	408	524	68	298	815	541	60	370	700	286	270
	Pond-2	96	391	121	11	379	1037	313	37	475	348	311	397
Sample-2	Pond-3	301	368	452	508	80	85	101	370	563	483	538	502
	Pond-4	383	472	408	71	247	462	577	77	472	537	500	401
Sample-3	Pond-5	111	130	130	155	101	165	184	166	490	431	148	186
	Pond-6	99	261	211	185	160	112	135	185	100	717	298	137
Sample-4	Pond-7	237	433	378	113	279	312	258	308	713	780	241	312

Table-176
Monthly fluctuations of *Branchiodrillus* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter^2)	May'98 (individual/meter^2)	June'98 (individual/meter^2)	July'98 (individual/meter^2)	August'98 (individual/meter^2)	September'98 (individual/meter^2)	October'98 (individual/meter^2)	November'98 (individual/meter^2)	December'98 (individual/meter^2)	January'99 (individual/meter^2)	February'99 (individual/meter^2)	March'99 (individual/meter^2)
Sample-1	Pond-1	238	689	369	90	63	102	192	899	51	288	340	128
	Pond-2	287	454	103	43	50	165	77	369	63	310	395	103
Sample-2	Pond-3	423	1817	809	108	29	110	318	418	220	780	1703	310
	Pond-4	351	1376	1162	65	73	283	117	756	1187	733	673	347
Sample-3	Pond-5	669	310	501	392	470	315	415	445	881	868	1524	745
	Pond-6	295	242	651	489	226	249	218	313	848	513	600	982
Sample-4	Pond-7	1030	1097	1385	453	337	659	439	375	893	813	576	709

Table-177

Monthly fluctuations of *Branchiodrillus* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter²)	May'99 (individual/meter²)	June'99 (individual/meter²)	July'99 (individual/meter²)	August'99 (individual/meter²)	September'99 (individual/meter²)	October'99 (individual/meter²)	November'99 (individual/meter²)	December'99 (individual/meter²)	January, 2000 (individual/meter²)	February, 2000 (individual/meter²)	March, 2000 (individual/meter²)
Sample-1	Pond-1	138	537	257	81	67	75	293	766	59	293	326	114
	Pond-2	488	420	310	75	35	117	811	476	183	321	344	226
Sample-2	Pond-3	568	719	494	604	599	185	321	586	690	747	913	405
	Pond-4	463	533	529	176	322	700	757	833	808	559	696	488
Sample-3	Pond-5	512	303	369	373	285	516	456	447	773	869	489	498
	Pond-6	492	269	421	336	536	628	390	480	425	354	496	543
Sample-4	Pond-7	1157	1079	895	226	441	460	515	565	1153	717	883	1660

Table-178

Monthly fluctuations of Chironomids in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter²)	May'98 (individual/meter²)	June'98 (individual/meter²)	July'98 (individual/meter²)	August'98 (individual/meter²)	September'98 (individual/meter²)	October'98 (individual/meter²)	November'98 (individual/meter²)	December'98 (individual/meter²)	January'99 (individual/meter²)	February'99 (individual/meter²)	March'99 (individual/meter²)
Sample-1	Pond-1	1618	936	989	1577	603	1130	733	587	977	580	1103	831
	Pond-2	1136	942	1133	1333	913	1103	931	836	713	536	630	740
Sample-2	Pond-3	4003	1600	1364	1090	524	1012	575	1112	2400	1623	1708	1900
	Pond-4	3391	2178	1501	1890	717	933	621	1312	1933	1117	2137	2337
Sample-3	Pond-5	2833	2130	865	1103	710	603	509	1933	1233	1021	1333	2148
	Pond-6	3133	1833	733	1085	768	571	517	2038	1368	1321	1134	1938
Sample-4	Pond-7	3618	1891	1710	1913	1038	1167	972	1332	2184	1073	1906	2172

Table-179

Percentage of Chironomids of different ponds in April'98-March'99.

Sample	Pond	April'98 (%)	May'98 (%)	June'98 (%)	July'98 (%)	August'98 (%)	September'98 (%)	October'98 (%)	November'98 (%)	December'98 (%)	January'99 (%)	February'99 (%)	March'99 (%)
Sample-1	Pond-1	40.85	57.10	50	31.90	50.80	45.21	55.21	68.58	34.40	55.85	38.55	43.06
	Pond-2	40.32	42.50	47.98	62.96	42.50	39.28	34.73	36.53	36.40	26.64	29.70	35.8
Sample-2	Pond-3	59.99	27.42	23.14	36.37	25.7	26.65	22.96	23.40	27.86	24.81	24.80	31.28
	Pond-4	53.68	39.80	29.38	67.98	39.54	28.00	29.11	30.70	24.01	18.15	34.52	42.28
Sample-3	Pond-5	53.60	44.25	20.98	43.82	34.83	21.44	22.94	47.08	22.21	19.79	22.85	38.9
	Pond-6	64.13	42.06	18.24	44.41	41.87	22.73	25.49	63.11	26.44	27.22	26.15	44.58
Sample-4	Pond-7	45.39	27.01	30.36	49.85	35.45	23.30	27.62	34.45	32.32	17.31	29.16	31.60

Table-180

Monthly fluctuations of Chironomids in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter^2)	May'99 (individual/meter^2)	June'99 (individual/meter^2)	July'99 (individual/meter^2)	August'99 (individual/meter^2)	September'99 (individual/meter^2)	October'99 (individual/meter^2)	November'99 (individual/meter^2)	December'99 (individual/meter^2)	January, 2000 (individual/meter^2)	February, 2000 (individual/meter^2)	March, 2000 (individual/meter^2)
Sample-1	Pond-1	1412	1012	1037	1318	533	912	733	689	613	512	933	918
	Pond-2	981	1042	1188	1533	1078	1230	991	801	618	610	717	610
Sample-2	Pond-3	3872	2100	2684	1207	974	719	618	1303	2103	1908	2911	2100
	Pond-4	3536	1818	1664	1800	937	1037	836	1108	2001	989	1871	2066
Sample-3	Pond-5	2590	2395	933	831	890	713	617	2108	1643	1321	1937	2497
	Pond-6	2899	2208	1031	1385	988	718	703	1877	1480	1618	933	2318
Sample-4	Pond-7	4713	2319	2052	1617	1618	1008	1618	1833	1313	1077	2118	2518

Table-181
Percentage of Chironomids of different ponds in April'99-March, 2000.

Sample	Pond	April'99 (%)	May'99 (%)	June'99 (%)	July'99 (%)	August'99 (%)	September'99 (%)	October'99 (%)	November'99 (%)	December'99 (%)	January, 2000 (%)	February, 2000 (%)	March, 2000 (%)
Sample-1	Pond-1	55.68	43.77	37.8	54.50	26.2	34.70	29.1	28.6	33.79	23.63	40.3	38.44
	Pond-2	33.73	43.11	52.31	64.41	44.94	38.69	39.85	34.4	30.37	26.86	30.34	25.80
Sample-2	Pond-3	54.87	34.35	38.99	27.22	25.39	31.11	30.05	35.27	30.77	25.89	30.50	32.25
	Pond-4	49.27	28.33	31.08	55.68	34.47	21.52	25.28	29.52	31.09	19.34	29.61	33.22
Sample-3	Pond-5	52.84	50.67	23.49	35.63	46.40	28.89	30.29	53.39	30.69	26.31	42.84	47.75
	Pond-6	54.96	44.33	26.51	49.34	39.84	25.74	37.45	51.09	30.41	35.09	23.21	54.89
Sample-4	Pond-7	52.32	28.36	31.94	39.27	36.88	38.72	37.47	36.10	18.42	20.18	37.53	31.06

Table-182
Monthly fluctuations of *Chironomus* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter^2)	May'98 (individual/meter^2)	June'98 (individual/meter^2)	July'98 (individual/meter^2)	August'98 (individual/meter^2)	September'98 (individual/meter^2)	October'98 (individual/meter^2)	November'98 (individual/meter^2)	December'98 (individual/meter^2)	January'99 (individual/meter^2)	February'99 (individual/meter^2)	March'99 (individual/meter^2)
Sample-1	Pond-1	600	505	760	1150	138	420	380	158	320	127	462	357
	Pond-2	488	496	577	936	212	512	291	217	281	139	221	298
Sample-2	Pond-3	1502	863	1060	806	121	378	299	308	803	370	730	828
	Pond-4	836	773	438	737	138	401	170	378	480	387	438	671
Sample-3	Pond-5	862	580	130	211	213	218	170	586	487	512	508	936
	Pond-6	826	513	213	498	233	175	162	849	508	463	434	822
Sample-4	Pond-7	972	717	481	539	198	208	127	239	612	185	521	580

Table-183
Monthly fluctuations of *Chironomus* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter^2)	May'99 (individual/meter^2)	June'99 (individual/meter^2)	July'99 (individual/meter^2)	August'99 (individual/meter^2)	September'99 (individual/meter^2)	October'99 (individual/meter^2)	November'99 (individual/meter^2)	December'99 (individual/meter^2)	January, 2000 (individual/meter^2)	February, 2000 (individual/meter^2)	March, 2000 (individual/meter^2)
Sample-1	Pond-1	564	618	701	918	111	355	403	191	202	107	401	403
	Pond-2	431	443	701	987	228	503	411	261	299	211	207	183
Sample-2	Pond-3	1030	912	988	333	290	299	211	321	840	810	1056	846
	Pond-4	983	779	501	808	283	812	398	287	717	207	590	818
Sample-3	Pond-5	767	712	148	212	101	218	186	869	608	498	528	757
	Pond-6	826	588	190	240	138	211	216	517	243	267	135	722
Sample-4	Pond-7	1567	836	801	698	703	457	691	512	319	273	856	912

Table-184
Monthly fluctuations of *Tanypus* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter^2)	May'98 (individual/meter^2)	June'98 (individual/meter^2)	July'98 (individual/meter^2)	August'98 (individual/meter^2)	September'98 (individual/meter^2)	October'98 (individual/meter^2)	November'98 (individual/meter^2)	December'98 (individual/meter^2)	January'99 (individual/meter^2)	February'99 (individual/meter^2)	March'99 (individual/meter^2)
Sample-1	Pond-1	33	10	10	16	157	20	210	41	107	41	55	174
	Pond-2	41	17	13	39	241	39	431	82	95	57	23	210
Sample-2	Pond-3	90	28	7	6	138	246	168	78	260	120	100	402
	Pond-4	213	86	239	242	202	76	413	75	463	180	131	418
Sample-3	Pond-5	418	366	186	207	109	81	74	278	83	73	136	318
	Pond-6	513	210	97	63	103	70	68	265	77	121	74	298
Sample-4	Pond-7	684	235	397	410	210	257	185	276	485	210	429	488

Table-185
Monthly fluctuations of *Tanypus* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter^2)	May'99 (individual/meter^2)	June'99 (individual/meter^2)	July'99 (individual/meter^2)	August'99 (individual/meter^2)	September'99 (individual/meter^2)	October'99 (individual/meter^2)	November'99 (individual/meter^2)	December'99 (individual/meter^2)	January, 2000 (individual/meter^2)	February, 2000 (individual/meter^2)	March, 2000 (individual/meter^2)
Sample-1	Pond-1	40	21	7	8	138	27	197	55	69	36	46	201
	Pond-2	17	27	39	48	233	39	333	77	101	73	101	103
Sample-2	Pond-3	888	288	487	210	75	156	108	111	512	498	548	448
	Pond-4	872	377	412	307	140	76	121	168	412	81	172	477
Sample-3	Pond-5	530	470	170	212	170	110	97	380	217	137	380	508
	Pond-6	481	356	203	312	167	95	101	381	281	319	213	480
Sample-4	Pond-7	938	91	140	123	181	212	214	338	217	167	212	111

Table-186
Monthly fluctuations of *Corynoneura* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter^2)	May'98 (individual/meter^2)	June'98 (individual/meter^2)	July'98 (individual/meter^2)	August'98 (individual/meter^2)	September'98 (individual/meter^2)	October'98 (individual/meter^2)	November'98 (individual/meter^2)	December'98 (individual/meter^2)	January'99 (individual/meter^2)	February'99 (individual/meter^2)	March'99 (individual/meter^2)
Sample-1	Pond-1	17	13	207	95	60	270	50	11	5	23	33	16
	Pond-2	21	37	181	181	39	311	91	30	7	31	17	51
Sample-2	Pond-3	39	8	68	68	59	26	41	28	30	78	60	40
	Pond-4	703	111	215	293	76	283	70	292	409	79	94	533
Sample-3	Pond-5	366	216	78	110	67	45	35	181	45	60	180	212
	Pond-6	338	140	66	65	50	18	31	272	111	179	39	190
Sample-4	Pond-7	117	117	128	133	152	130	130	179	178	115	221	239

Table-187
Monthly fluctuations of *Corynoneura* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter^2)	May'99 (individual/meter^2)	June'99 (individual/meter^2)	July'99 (individual/meter^2)	August'99 (individual/meter^2)	September'99 (individual/meter^2)	October'99 (individual/meter^2)	November'99 (individual/meter^2)	December'99 (individual/meter^2)	January, 2000 (individual/meter^2)	February, 2000 (individual/meter^2)	March, 2000 (individual/meter^2)
Sample-1	Pond-1	16	7	61	67	99	218	58	19	9	25	38	28
	Pond-2	23	31	253	165	71	311	37	21	11	31	58	26
Sample-2	Pond-3	733	170	275	177	111	45	90	250	198	150	336	257
	Pond-4	678	130	72	177	86	178	37	49	79	79	81	270
Sample-3	Pond-5	297	261	181	184	120	72	22	295	180	150	175	312
	Pond-6	277	208	95	213	177	67	55	135	210	265	165	287
Sample-4	Pond-7	987	97	321	133	125	139	107	111	59	101	301	79

Table-188
Monthly fluctuations of *Pelopia* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter^2)	May'98 (individual/meter^2)	June'98 (individual/meter^2)	July'98 (individual/meter^2)	August'98 (individual/meter^2)	September'98 (individual/meter^2)	October'98 (individual/meter^2)	November'98 (individual/meter^2)	December'98 (individual/meter^2)	January'99 (individual/meter^2)	February'99 (individual/meter^2)	March'99 (individual/meter^2)
Sample-1	Pond-1	132	270	100	283	138	22	58	120	127	90	313	149
	Pond-2	181	211	87	128	191	7	77	287	136	110	210	131
Sample-2	Pond-3	351	459	161	201	404	24	49	238	318	260	508	350
	Pond-4	658	570	76	137	111	23	28	181	198	73	1097	310
Sample-3	Pond-5	413	346	113	148	146	108	119	212	286	221	140	356
	Pond-6	416	198	131	108	137	135	112	221	213	258	201	312
Sample-4	Pond-7	523	347	256	317	107	111	95	137	217	167	310	276

Table-189
Monthly fluctuations of *Pelopia* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter^2)	May'99 (individual/meter^2)	June'99 (individual/meter^2)	July'99 (individual/meter^2)	August'99 (individual/meter^2)	September'99 (individual/meter^2)	October'99 (individual/meter^2)	November'99 (individual/meter^2)	December'99 (individual/meter^2)	January, 2000 (individual/meter^2)	February, 2000 (individual/meter^2)	March, 2000 (individual/meter^2)
Sample-1	Pond-1	121	313	113	263	325	25	51	141	74	81	270	175
	Pond-2	210	299	123	287	293	48	91	211	97	113	233	199
Sample-2	Pond-3	312	310	480	207	388	81	78	217	112	212	512	149
	Pond-4	171	291	113	83	78	91	49	240	317	331	417	101
Sample-3	Pond-5	531	470	49	95	101	181	146	281	212	240	294	517
	Pond-6	431	318	120	198	90	168	135	247	217	190	117	480
Sample-4	Pond-7	136	418	256	278	312	318	295	257	180	212	372	514

Table-190
Monthly fluctuations of *Pentaneura* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter^2)	May'98 (individual/meter^2)	June'98 (individual/meter^2)	July'98 (individual/meter^2)	August'98 (individual/meter^2)	September'98 (individual/meter^2)	October'98 (individual/meter^2)	November'98 (individual/meter^2)	December'98 (individual/meter^2)	January'99 (individual/meter^2)	February'99 (individual/meter^2)	March'99 (individual/meter^2)
Sample-1	Pond-1	836	138	88	33	110	398	35	257	418	299	232	135
	Pond-2	405	181	275	49	230	284	41	220	194	199	159	50
Sample-2	Pond-3	2021	242	68	9	86	338	18	460	989	795	310	280
	Pond-4	981	638	533	482	190	140	60	386	383	398	377	401
Sample-3	Pond-5	774	622	358	427	175	157	398	676	332	255	369	326
	Pond-6	1040	772	176	351	245	173	144	431	459	300	386	316
Sample-4	Pond-7	1322	775	498	514	366	461	436	501	692	396	425	569

Table-191

Monthly fluctuations of *Pentaneura* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter²)	May'99 (individual/meter²)	June'99 (individual/meter²)	July'99 (individual/meter²)	August'99 (individual/meter²)	September'99 (individual/meter²)	October'99 (individual/meter²)	November'99 (individual/meter²)	December'99 (individual/meter²)	January, 2000 (individual/meter²)	February, 2000 (individual/meter²)	March, 2000 (individual/meter²)
Sample-1	Pond-1	671	53	151	62	100	287	24	278	259	263	178	514
	Pond-2	300	282	72	76	253	329	149	231	110	182	118	99
Sample-2	Pond-3	909	418	434	280	110	138	131	404	391	238	459	400
	Pond-4	832	241	566	425	350	380	231	364	476	412	611	400
Sample-3	Pond-5	465	482	335	128	398	132	166	283	226	296	560	403
	Pond-6	884	738	423	422	416	177	196	657	529	577	303	345
Sample-4	Pond-7	1085	877	539	385	399	682	313	615	538	324	377	902

Table-192

Monthly fluctuations of *Lamillidens* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter²)	May'98 (individual/meter²)	June'98 (individual/meter²)	July'98 (individual/meter²)	August'98 (individual/meter²)	September'98 (individual/meter²)	October'98 (individual/meter²)	November'98 (individual/meter²)	December'98 (individual/meter²)	January'99 (individual/meter²)	February'99 (individual/meter²)	March'99 (individual/meter²)
Sample-1	Pond-1	17	30	90	33	40	48	200	28	101	59	61	97
	Pond-2	23	37	113	41	81	20	211	78	75	67	50	71
Sample-2	Pond-3	108	206	375	186	250	162	58	118	250	142	58	178
	Pond-4	71	63	143	97	168	109	86	99	138	142	73	211
Sample-3	Pond-5	211	62	218	68	185	183	87	212	238	185	180	231
	Pond-6	165	178	188	49	85	210	78	181	201	198	158	188
Sample-4	Pond-7	135	418	79	165	185	231	61	185	160	188	245	312

Table-193

Monthly fluctuations of *Lamillidens* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter^2)	May'99 (individual/meter^2)	June'99 (individual/meter^2)	July'99 (individual/meter^2)	August'99 (individual/meter^2)	September'99 (individual/meter^2)	October'99 (individual/meter^2)	November'99 (individual/meter^2)	December'99 (individual/meter^2)	January, 2000 (individual/meter^2)	February, 2000 (individual/meter^2)	March, 2000 (individual/meter^2)
Sample-1	Pond-1	18	33	127	42	100	58	205	14	87	30	38	74
	Pond-2	29	81	73	39	71	57	181	170	91	81	103	111
Sample-2	Pond-3	212	160	256	188	430	169	140	190	203	312	157	211
	Pond-4	178	412	130	110	148	240	56	153	163	107	276	291
Sample-3	Pond-5	310	81	210	77	82	180	65	208	226	286	231	285
	Pond-6	233	201	211	165	85	211	31	275	285	195	197	201
Sample-4	Pond-7	171	731	357	412	297	231	65	318	257	195	301	390

Table-194

Monthly fluctuations of *Lymnea* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter^2)	May'98 (individual/meter^2)	June'98 (individual/meter^2)	July'98 (individual/meter^2)	August'98 (individual/meter^2)	September'98 (individual/meter^2)	October'98 (individual/meter^2)	November'98 (individual/meter^2)	December'98 (individual/meter^2)	January'99 (individual/meter^2)	February'99 (individual/meter^2)	March'99 (individual/meter^2)
Sample-1	Pond-1	2	3	4	2	5	3	6	4	31	5	51	80
	Pond-2	7	8	14	9	11	5	17	24	39	11	47	43
Sample-2	Pond-3	18	8	6	4	4	11	8	8	54	24	--	--
	Pond-4	21	13	78	31	70	31	36	78	77	38	138	95
Sample-3	Pond-5	117	73	101	87	64	77	81	73	87	71	46	130
	Pond-6	81	19	31	61	39	115	29	37	45	110	121	80
Sample-4	Pond-7	85	521	110	112	148	303	55	89	176	85	278	291

Table-195

Monthly fluctuations of *Lymnea* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter^2)	May'99 (individual/meter^2)	June'99 (individual/meter^2)	July'99 (individual/meter^2)	August'99 (individual/meter^2)	September'99 (individual/meter^2)	October'99 (individual/meter^2)	November'99 (individual/meter^2)	December'99 (individual/meter^2)	January, 2000 (individual/meter^2)	February, 2000 (individual/meter^2)	March, 2000 (individual/meter^2)
Sample-1	Pond-1	2	2	4	2	5	5	5	2	17	5	--	--
	Pond-2	37	33	18	21	9	4	17	23	39	23	81	107
Sample-2	Pond-3	111	51	160	140	80	41	87	95	136	130	131	113
	Pond-4	37	140	81	117	121	183	37	107	78	81	161	120
Sample-3	Pond-5	86	115	115	120	119	186	97	185	118	90	110	101
	Pond-6	95	113	90	89	113	95	43	91	111	165	99	103
Sample-4	Pond-7	67	512	418	367	318	295	39	117	95	67	217	298

Table-196

Monthly fluctuations of *Viviparous* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter^2)	May'98 (individual/meter^2)	June'98 (individual/meter^2)	July'98 (individual/meter^2)	August'98 (individual/meter^2)	September'98 (individual/meter^2)	October'98 (individual/meter^2)	November'98 (individual/meter^2)	December'98 (individual/meter^2)	January'99 (individual/meter^2)	February'99 (individual/meter^2)	March'99 (individual/meter^2)
Sample-1	Pond-1	55	13	71	41	50	70	55	57	69	107	160	200
	Pond-2	81	26	103	70	47	31	37	161	31	191	91	126
Sample-2	Pond-3	336	79	280	222	132	262	88	354	208	268	218	366
	Pond-4	96	31	213	86	56	90	32	136	86	176	83	111
Sample-3	Pond-5	87	91	103	90	65	149	19	109	80	148	130	128
	Pond-6	130	67	131	129	105	87	60	113	185	107	147	123
Sample-4	Pond-7	108	78	38	97	90	70	17	95	69	71	61	51

Table-197

Monthly fluctuations of *Viviparous* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter^2)	May'99 (individual/meter^2)	June'99 (individual/meter^2)	July'99 (individual/meter^2)	August'99 (individual/meter^2)	September'99 (individual/meter^2)	October'99 (individual/meter^2)	November'99 (individual/meter^2)	December'99 (individual/meter^2)	January, 2000 (individual/meter^2)	February, 2000 (individual/meter^2)	March, 2000 (individual/meter^2)
Sample-1	Pond-1	60	13	87	50	55	90	29	42	70	55	130	145
	Pond-2	101	109	81	93	81	79	73	103	81	170	137	103
Sample-2	Pond-3	85	83	203	70	181	73	42	110	100	160	99	156
	Pond-4	69	277	36	71	83	173	48	77	42	90	145	147
Sample-3	Pond-5	101	57	74	61	41	77	49	103	75	101	103	190
	Pond-6	97	67	217	90	47	135	85	185	166	97	130	97
Sample-4	Pond-7	133	349	95	111	101	90	53	157	130	112	87	211

Table-198

Monthly fluctuations of *Indoplanorbis* in different ponds in April'98-March'99.

Sample	Pond	April'98 (individual/meter^2)	May'98 (individual/meter^2)	June'98 (individual/meter^2)	July'98 (individual/meter^2)	August'98 (individual/meter^2)	September'98 (individual/meter^2)	October'98 (individual/meter^2)	November'98 (individual/meter^2)	December'98 (individual/meter^2)	January'99 (individual/meter^2)	February'99 (individual/meter^2)	March'99 (individual/meter^2)
Sample-1	Pond-1	75	65	248	83	234	197	84	39	132	208	46	136
	Pond-2	169	124	318	92	179	74	113	208	125	102	30	96
Sample-2	Pond-3	28	22	19	8	94	68	54	--	68	216	34	180
	Pond-4	134	161	276	103	213	203	63	198	170	181	123	401
Sample-3	Pond-5	115	164	178	135	75	200	63	243	206	179	162	128
	Pond-6	105	146	283	152	68	203	52	320	272	196	95	199
Sample-4	Pond-7	119	586	142	129	110	408	70	149	125	95	328	398

Table-199

Monthly fluctuations of *Indoplanorbis* in different ponds in April'99-March, 2000.

Sample	Pond	April'99 (individual/meter^2)	May'99 (individual/meter^2)	June'99 (individual/meter^2)	July'99 (individual/meter^2)	August'99 (individual/meter^2)	September'99 (individual/meter^2)	October'99 (individual/meter^2)	November'99 (individual/meter^2)	December'99 (individual/meter^2)	January, 2000 (individual/meter^2)	February, 2000 (individual/meter^2)	March, 2000 (individual/meter^2)
Sample-1	Pond-1	81	83	290	113	254	255	162	65	237	228	250	393
	Pond-2	143	67	76	125	84	102	140	217	42	144	187	97
Sample-2	Pond-3	348	124	119	192	33	148	42	216	272	215	130	139
	Pond-4	146	728	77	121	146	222	57	144	60	70	246	447
Sample-3	Pond-5	114	158	148	153	135	135	98	278	114	141	234	140
	Pond-6	219	162	185	144	173	89	149	162	410	332	42	298
Sample-4	Pond-7	209	915	448	660	393	391	142	420	363	306	407	722

Table-200

Monthly variation in plankton Biomass production in constant wet weight basis in different ponds during April'98-March'99.

Sample	Pond	April'98 (mg/liter)	May'98 (mg/liter)	June'98 (mg/liter)	July'98 (mg/liter)	August'98 (mg/liter)	September'98 (mg/liter)	October'98 (mg/liter)	November'98 (mg/liter)	December'98 (mg/liter)	January'99 (mg/liter)	February'99 (mg/liter)	March'99 (mg/liter)
Sample-1	Pond-1	18.30	21.87	24.51	20.48	18.30	22.17	19.81	23.93	19.73	20.37	19.51	23.60
	Pond-2	16.1	20.3	18.3	20.4	21.70	20.35	16.50	20.18	17.17	18.51	14.50	20.15
Sample-2	Pond-3	31.5	49.3	81.3	22.3	59.8	38.5	30.3	42.5	35.1	38.4	28.2	60.33
	Pond-4	30.4	47.2	77.3	20.1	55.1	31.3	27.4	40.1	32.1	34.1	26.1	51.13
Sample-3	Pond-5	26.1	35.4	60	22.7	52.1	31.7	25.10	29.1	29.1	29.8	24.2	28
	Pond-6	22.1	32.4	39.4	20.2	37.1	28.8	23.7	25.5	27.3	27.1	22.3	23.3
Sample-4	Pond-7	29	76	39	24	56	31	30	41	42	36	31	54

Table-201
Monthly variation in Plankton Biomass production in constant wet weight basis in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (mg/liter)	May'99 (mg/liter)	June'99 (mg/liter)	July'99 (mg/liter)	August'99 (mg/liter)	September'99 (mg/liter)	October'99 (mg/liter)	November'99 (mg/liter)	December'99 (mg/liter)	January, 2000 (mg/liter)	February, 2000 (mg/liter)	March, 2000 (mg/liter)
Sample-1	Pond-1	17.18	20.30	23.57	19.18	17.59	23.12	18.37	22.8	18.57	19.10	16.59	22.50
	Pond-2	15.8	19.3	17.4	19.1	20.30	19.5	14.8	19.3	16.10	17.15	17.1	19.15
Sample-2	Pond-3	28.3	42.1	80.1	24.3	60.1	32.4	31.8	45.3	39.1	40.2	30.1	57.11
	Pond-4	28	41	75.1	23	55	30	29.8	40.3	38	35.1	30.1	53.8
Sample-3	Pond-5	24.3	33.3	58	20.9	50.1	29.7	24.03	27.1	27.2	27.8	24.1	26.8
	Pond-6	20.1	31.2	37.8	20.4	32.1	30.1	25.3	26.1	28.1	26.2	23.5	24.1
Sample-4	Pond-7	30	78	44	26	57	33	31.2	42	43	36	32.2	55.1

Table-202
Monthly variation in Plankton Biomass production in constant dry weight basis in different ponds during April'98-March'99.

Sample	Pond	April'98 (mg/liter)	May'98 (mg/liter)	June'98 (mg/liter)	July'98 (mg/liter)	August'98 (mg/liter)	September'98 (mg/liter)	October'98 (mg/liter)	November'98 (mg/liter)	December'98 (mg/liter)	January'99 (mg/liter)	February'99 (mg/liter)	March'99 (mg/liter)
Sample-1	Pond-1	3.10	3.71	4.75	4.54	3.81	3.31	3.54	3.33	4.22	3.17	2.55	3.41
	Pond-2	3.17	2.79	3.20	3.51	3.71	3.40	2.21	3.29	3.18	4.13	2.81	3.09
Sample-2	Pond-3	6.38	6.81	7.98	6.28	7.41	6.72	6.13	6.78	6.78	6.61	5.61	5.69
	Pond-4	5.28	5.82	7.11	6.15	6.08	6.51	6.18	6.32	5.23	5.89	6.13	6.59
Sample-3	Pond-5	4.02	4.80	5.90	4.90	5.60	4.50	5.30	5.80	6.13	5.87	4.21	4.98
	Pond-6	3.8	4.2	6.10	4.3	4.8	5.13	5.12	5.28	4.1	5.65	4.80	4.20
Sample-4	Pond-7	6.38	7.30	6.27	6.05	6.18	6.10	6.03	6.11	6.89	6.94	5.98	5.34

Table-203
Monthly variation in Plankton Biomass production in constant dry weight basis in different ponds during April'99-March, 2000.

Sample	Pond	April'99 (mg/liter)	May'99 (mg/liter)	June'99 (mg/liter)	July'99 (mg/liter)	August'99 (mg/liter)	September'99 (mg/liter)	October'99 (mg/liter)	November'99 (mg/liter)	December'99 (mg/liter)	January, 2000 (mg/liter)	February, 2000 (mg/liter)	March, 2000 (mg/liter)
Sample-1	Pond-1	2.98	3.27	4.18	4.12	3.27	3.10	3.99	4.08	4.05	3.97	2.87	3.11
	Pond-2	3.11	2.99	2.99	3.25	3.50	3.13	2.59	3.03	3.11	4.10	2.12	2.91
Sample-2	Pond-3	6.91	6.21	7.28	5.99	7.03	6.13	5.59	6.18	6.40	6.31	6.03	5.70
	Pond-4	6.17	6.08	7.10	5.90	6.11	5.98	5.79	6.01	7.02	6.70	5.78	5.14
Sample-3	Pond-5	4.01	4.3	4.30	3.90	5.20	5.40	5.10	5.20	5.90	5.67	3.92	4.10
	Pond-6	3.6	4.1	6.1	4.1	4.3	4.98	5.08	5.11	3.9	5.10	4.63	4.15
Sample-4	Pond-7	6.31	7.78	6.21	5.99	6.18	6.11	5.91	6.09	7.18	6.91	6.11	5.78

Table-204
The area, final population details in seven ponds in two years.

Year	Pond	Area (ha)	Silver		Catla		Rui		Mrigal		Carpio		Total Population in Each Pond (number)	Total Population / ha (number)
			Ratio	Num.	Ratio	Num.	Ratio	Num.	Ratio	Num.	Ratio	Num.		
FIRST YEAR APRIL'98-MARCH'99	Pond-1	0.34	20 %	1100	20 %	1100	20 %	1120	20 %	1100	20 %	1100	5500	15980
	Pond-2	0.35	20 %	1120	20 %	1120	20 %	1120	20 %	1120	20 %	1120	5600	15720
	Pond-3	0.36	20 %	1160	20 %	1160	20 %	1160	20 %	1160	20 %	1160	5800	15918
	Pond-4	0.38	20 %	1224	20 %	1224	20 %	1224	20 %	1224	20 %	1224	6120	15910
	Pond-5	0.38	20 %	1200	20 %	1200	20 %	1200	20 %	1200	20 %	1200	6000	15770
	Pond-6	0.37	20 %	1200	20 %	1200	20 %	1200	20 %	1200	20 %	1200	6000	15770
	Pond-7	0.34	20 %	1040	20 %	1040	20 %	1040	20 %	1040	20 %	1040	5200	14595
SECOND YEAR APRIL'99-MARCH, 2000	Pond-1	0.34	24 %	1320	6 %	330	20 %	1100	15 %	825	35 %	1925	5500	15979
	Pond-2	0.35	24 %	1344	6 %	336	20 %	1120	15 %	840	35 %	1960	5600	15716
	Pond-3	0.36	24 %	1392	6 %	348	20 %	1160	15 %	870	35 %	2030	5800	15916
	Pond-4	0.38	24 %	1468	6 %	368	20 %	1224	15 %	918	35 %	2142	6120	15909
	Pond-5	0.38	21 %	1365	6 %	585	20 %	1300	15 %	975	35 %	2275	6000	15770
	Pond-6	0.37	24 %	1440	6 %	360	20 %	1200	15 %	900	35 %	2100	6000	15770
	Pond-7	0.34	24 %	1253	6 %	307	20 %	1040	15 %	700	35 %	1820	5200	14595

Silver Carp

Pond-1:

Table-205
Showing daily and monthly fluctuation of body weight.

(*Hypophthalmichthys molitrix*) Silver Carp				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	7	# #	# #
	MAY	13	6	.19
	JUNE	22	9	.30
	JULY	36	14	.45
	AUGUST	65	29	.93
	SEPTEMBER	98	33	1.10
	OCTOBER	119	21	.67
	NOVEMBER	137	18	.60
	DECEMBER	145	8	.25
	JANUARY	152	7	.22
	FEBRUARY	163	11	.37
	MARCH	180	17	.54
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	6	# #	# #
	MAY	13	7	.22
	JUNE	21	8	.26
	JULY	34	13	.41
	AUGUST	61	27	.87
	SEPTEMBER	92	31	1.03
	OCTOBER	112	20	.64
	NOVEMBER	130	18	.60
	DECEMBER	141	11	.35
	JANUARY	149	8	.25
	FEBRUARY	162	13	.44
	MARCH	178	16	.51

Pond-2:

Table-206
Showing daily and monthly fluctuation of body weight.

(*Hypophthalmichthys molitrix*) Silver Carp				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	6	# #	# #
	MAY	13	7	.22
	JUNE	22	9	.30
	JULY	35	13	.41
	AUGUST	61	26	.83
	SEPTEMBER	88	27	.90
	OCTOBER	118	30	.96
	NOVEMBER	137	19	.63
	DECEMBER	144	7	.22
	JANUARY	149	5	.16
	FEBRUARY	165	16	.53
	MARCH	191	26	.83
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	5	# #	# #
	MAY	13	8	.25
	JUNE	23	10	.33
	JULY	37	14	.45
	AUGUST	57	20	.64
	SEPTEMBER	81	24	.80
	OCTOBER	113	32	1.03
	NOVEMBER	133	20	.66
	DECEMBER	142	9	.29
	JANUARY	148	6	.19
	FEBRUARY	166	18	.60
	MARCH	185	19	.61

Pond-3:

Table-207
Showing daily and monthly fluctuation of body weight.

(Hypophthalmichthys molitrix) Silver Carp				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	7	##	##
	MAY	25	18	.58
	JUNE	46	21	.70
	JULY	86	40	1.29
	AUGUST	151	65	2.09
	SEPTEMBER	239	88	2.93
	OCTOBER	347	108	3.48
	NOVEMBER	437	90	3
	DECEMBER	487	50	1.61
	JANUARY	511	24	.77
	FEBRUARY	551	40	1.33
	MARCH	611	60	1.93
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	8	##	##
	MAY	27	19	.61
	JUNE	49	22	.73
	JULY	87	38	1.22
	AUGUST	155	68	2.19
	SEPTEMBER	245	90	3
	OCTOBER	356	111	3.58
	NOVEMBER	440	84	2.80
	DECEMBER	485	49	1.58
	JANUARY	515	26	.83
	FEBRUARY	553	38	1.26
	MARCH	614	61	1.96

Pond-4:

Table-208
Showing daily and monthly fluctuation of body weight.

(Hypophthalmichthys molitrix) Silver Carp				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL '98-MARCH'99	APRIL	8	# #	# #
	MAY	28	20	.64
	JUNE	51	23	.76
	JULY	94	43	1.38
	AUGUST	161	67	2.16
	SEPTEMBER	251	90	3
	OCTOBER	362	111	3.58
	NOVEMBER	450	88	2.93
	DECEMBER	505	55	1.77
	JANUARY	531	26	.83
	FEBRUARY	580	49	1.63
	MARCH	648	68	2.19
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	6	# #	# #
	MAY	24	18	.58
	JUNE	45	21	.70
	JULY	86	41	1.32
	AUGUST	151	65	2.09
	SEPTEMBER	241	90	3
	OCTOBER	357	116	3.74
	NOVEMBER	446	89	2.96
	DECEMBER	500	54	1.74
	JANUARY	523	23	.74
	FEBRUARY	568	45	1.50
	MARCH	641	73	2.35

Pond-5:

Table-209
Showing daily and monthly fluctuation of body weight.

(Hypophthalmichthys molitrix) Silver Carp				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	6	# #	# #
	MAY	36	30	.96
	JUNE	76	40	1.33
	JULY	122	46	1.48
	AUGUST	201	79	2.54
	SEPTEMBER	303	102	3.40
	OCTOBER	419	116	3.74
	NOVEMBER	519	100	3.33
	DECEMBER	595	76	2.45
	JANUARY	635	40	1.29
	FEBRUARY	705	70	2.33
	MARCH	802	97	3.12
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	7	# #	# #
	MAY	35	28	.90
	JUNE	73	38	1.26
	JULY	118	45	1.50
	AUGUST	193	75	2.41
	SEPTEMBER	294	101	3.36
	OCTOBER	409	115	3.70
	NOVEMBER	507	98	3.26
	DECEMBER	581	74	2.38
	JANUARY	619	38	1.22
	FEBRUARY	695	76	2.55
	MARCH	796	101	3.25

Pond-6:

Table-210
Showing daily and monthly fluctuation of body weight.

(Hypophthalmichthys molitrix) Silver Carp				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	8	##	##
	MAY	39	31	1.00
	JUNE	80	41	1.36
	JULY	125	45	1.45
	AUGUST	206	81	2.61
	SEPTEMBER	311	105	3.50
	OCTOBER	431	120	3.87
	NOVEMBER	533	102	3.40
	DECEMBER	604	71	2.29
	JANUARY	639	35	1.12
	FEBRUARY	719	80	2.58
	MARCH	813	94	3.03
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	6	##	##
	MAY	41	35	1.12
	JUNE	87	46	1.53
	JULY	140	53	1.70
	AUGUST	228	88	2.83
	SEPTEMBER	339	111	3.70
	OCTOBER	464	125	4.03
	NOVEMBER	569	105	3.50
	DECEMBER	647	78	2.51
	JANUARY	685	38	1.22
	FEBRUARY	761	76	2.53
	MARCH	855	94	3.03

Pond-7:

Table-211
Showing daily and monthly fluctuation of body weight.

(Hypophthalmichthys molitrix) Silver Carp				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	10	# #	# #
	MAY	48	38	1.22
	JUNE	103	55	1.83
	JULY	162	59	1.90
	AUGUST	262	100	3.22
	SEPTEMBER	375	113	3.76
	OCTOBER	503	128	4.12
	NOVEMBER	608	105	3.50
	DECEMBER	688	80	2.58
	JANUARY	733	45	1.45
	FEBRUARY	811	78	2.68
	MARCH	901	90	2.90
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	8	# #	# #
	MAY	47	39	1.25
	JUNE	100	53	1.76
	JULY	163	63	2.03
	AUGUST	268	105	3.38
	SEPTEMBER	394	126	4.20
	OCTOBER	526	132	4.25
	NOVEMBER	634	108	3.60
	DECEMBER	712	78	2.51
	JANUARY	752	40	1.29
	FEBRUARY	837	85	2.93
	MARCH	932	95	3.06

Table-212
Showing initial weight and final weight of Silver Carp in different ponds in two years period.

YEAR	POND-1		POND-2		POND-3		POND-4		POND-5		POND-6		POND-7	
	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)
FIRST YEAR	7	180	6	191	7	611	8	648	6	802	8	813	10	901
SECOND YEAR	6	178	5	185	8	614	6	641	7	796	6	855	8	932

Catla

Pond-1:

Table-213
Showing daily and monthly fluctuation of body weight.

(Catla catla) Catla				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL '98-MARCH '99	APRIL	5	##	##
	MAY	8	3	.10
	JUNE	13	5	.16
	JULY	19	6	.20
	AUGUST	28	9	.30
	SEPTEMBER	39	11	.36
	OCTOBER	53	14	.46
	NOVEMBER	61	8	.26
	DECEMBER	68	7	.23
	JANUARY	74	6	.20
	FEBRUARY	81	7	.23
	MARCH	90	9	.30
SECOND YEAR APRIL '99-MARCH, 2000	APRIL	6	##	##
	MAY	8	2	.06
	JUNE	11	3	.10
	JULY	16	5	.16
	AUGUST	23	7	.23
	SEPTEMBER	32	9	.30
	OCTOBER	44	12	.40
	NOVEMBER	51	7	.23
	DECEMBER	58	7	.23
	JANUARY	64	6	.20
	FEBRUARY	71	7	.23
	MARCH	80	9	.30

Pond-2:

Table-214
Showing daily and monthly fluctuation of body weight.

(Catla catla) Catla				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	5	# #	# #
	MAY	7	2	.06
	JUNE	10	3	.10
	JULY	16	6	.20
	AUGUST	24	8	.26
	SEPTEMBER	34	10	.33
	OCTOBER	46	14	.46
	NOVEMBER	54	8	.26
	DECEMBER	61	7	.23
	JANUARY	67	6	.20
	FEBRUARY	74	7	.23
	MARCH	86	12	.40
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	6	# #	# #
	MAY	9	3	.10
	JUNE	13	4	.13
	JULY	19	6	.20
	AUGUST	27	8	.26
	SEPTEMBER	38	11	.36
	OCTOBER	51	13	.43
	NOVEMBER	59	8	.26
	DECEMBER	66	7	.23
	JANUARY	71	5	.16
	FEBRUARY	77	6	.20
	MARCH	87	10	.33

Pond-3:

Table-215
Showing daily and monthly fluctuation of body weight.

(Catla catla) Catla				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	6	# #	# #
	MAY	17	11	.36
	JUNE	39	22	.73
	JULY	63	24	.80
	AUGUST	95	32	1.06
	SEPTEMBER	133	38	1.26
	OCTOBER	179	46	1.53
	NOVEMBER	207	28	.93
	DECEMBER	224	17	.56
	JANUARY	237	13	.43
	FEBRUARY	266	29	.96
	MARCH	311	45	1.50
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	6	# #	# #
	MAY	18	12	.40
	JUNE	41	23	.76
	JULY	67	26	.86
	AUGUST	96	29	.96
	SEPTEMBER	130	34	1.13
	OCTOBER	173	43	1.43
	NOVEMBER	201	28	.93
	DECEMBER	217	16	.53
	JANUARY	229	12	.40
	FEBRUARY	259	30	1
	MARCH	301	42	1.40

Pond-4:

Table-216
Showing daily and monthly fluctuation of body weight.

(*Catla catla*) Catla				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	7	# #	# #
	MAY	19	12	.40
	JUNE	39	20	.66
	JULY	64	25	.83
	AUGUST	95	31	1.03
	SEPTEMBER	134	39	1.30
	OCTOBER	182	48	1.60
	NOVEMBER	212	30	1
	DECEMBER	232	20	.66
	JANUARY	233	15	.50
	FEBRUARY	270	37	1.23
	MARCH	320	50	1.66
SECOND YEAR APRIL '99-MARCH, 2000	APRIL	6	# #	# #
	MAY	19	13	.43
	JUNE	40	21	.70
	JULY	66	26	.86
	AUGUST	96	30	1.00
	SEPTEMBER	136	40	1.33
	OCTOBER	186	50	1.66
	NOVEMBER	217	31	1.03
	DECEMBER	241	24	.80
	JANUARY	257	16	.53
	FEBRUARY	288	31	1.03
	MARCH	333	45	1.50

Pond-5:

Table-217
Showing daily and monthly fluctuation of body weight.

(*Catla catla*) Catla				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	6	# #	# #
	MAY	21	15	.50
	JUNE	43	22	.73
	JULY	69	26	.86
	AUGUST	101	32	1.06
	SEPTEMBER	140	39	1.30
	OCTOBER	192	52	1.73
	NOVEMBER	222	30	1
	DECEMBER	244	22	.73
	JANUARY	260	16	.53
	FEBRUARY	292	32	1.06
	MARCH	340	48	1.60
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	6	# #	# #
	MAY	19	13	.43
	JUNE	38	19	.63
	JULY	64	26	.86
	AUGUST	94	30	1
	SEPTEMBER	132	38	1.26
	OCTOBER	182	50	1.66
	NOVEMBER	210	28	.93
	DECEMBER	229	19	.63
	JANUARY	244	15	.50
	FEBRUARY	272	28	.93
	MARCH	316	44	1.46

Pond-6:

Table-218
Showing daily and monthly fluctuation of body weight.

(Catla catla) Catla				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL '98-MARCH '99	APRIL	6	# #	# #
	MAY	18	12	.40
	JUNE	36	18	.60
	JULY	60	24	.80
	AUGUST	95	35	1.16
	SEPTEMBER	135	40	1.33
	OCTOBER	181	46	1.53
	NOVEMBER	205	24	.80
	DECEMBER	221	16	.53
	JANUARY	232	11	.36
	FEBRUARY	262	30	1
	MARCH	308	46	1.53
SECOND YEAR APRIL '99-MARCH, 2000	APRIL	7	# #	# #
	MAY	21	14	.46
	JUNE	41	20	.66
	JULY	66	25	.83
	AUGUST	97	31	1.03
	SEPTEMBER	133	36	1.20
	OCTOBER	182	49	1.63
	NOVEMBER	210	28	.93
	DECEMBER	230	20	.66
	JANUARY	245	15	.50
	FEBRUARY	277	32	1.06
	MARCH	320	43	1.43

Pond-7:

Table-219
Showing daily and monthly fluctuation of body weight.

(Catla catla) Catla				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	6	##	##
	MAY	22	16	.53
	JUNE	46	24	.80
	JULY	74	28	.93
	AUGUST	107	33	1.10
	SEPTEMBER	149	42	1.40
	OCTOBER	200	51	1.70
	NOVEMBER	231	39	1.30
	DECEMBER	257	26	.86
	JANUARY	275	18	.60
	FEBRUARY	311	36	1.20
	MARCH	370	59	1.96
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	7	##	##
	MAY	24	17	.56
	JUNE	50	26	.86
	JULY	80	30	1.00
	AUGUST	115	35	1.16
	SEPTEMBER	160	45	1.50
	OCTOBER	214	54	1.80
	NOVEMBER	254	40	1.33
	DECEMBER	284	30	1.00
	JANUARY	302	18	.60
	FEBRUARY	332	30	1.00
	MARCH	380	48	1.60

Table-220
Showing initial weight and final weight of Catla in different ponds in two years studied period.

YEAR	POND-1		POND-2		POND-3		POND-4		POND-5		POND-6		POND-7	
	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)
FIRST YEAR	5	90	5	86	6	311	7	320	6	340	6	308	6	370
SECOND YEAR	6	80	6	87	6	301	6	333	6	316	7	320	7	380

Rui

Pond no. 1

Table-221
Showing daily and monthly fluctuation of body weight.

(Labeo rohita) Rui				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	3	##	##
	MAY	6	3	.10
	JUNE	10	4	.13
	JULY	15	5	.16
	AUGUST	23	8	.26
	SEPTEMBER	34	11	.36
	OCTOBER	48	14	.46
	NOVEMBER	54	6	.20
	DECEMBER	59	5	.16
	JANUARY	64	5	.16
	FEBRUARY	73	9	.30
	MARCH	85	12	.40
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	4	##	##
	MAY	6	2	.06
	JUNE	9	3	.10
	JULY	14	5	.16
	AUGUST	21	7	.23
	SEPTEMBER	33	12	.40
	OCTOBER	47	14	.46
	NOVEMBER	55	8	.26
	DECEMBER	61	6	.20
	JANUARY	66	5	.16
	FEBRUARY	73	7	.23
	MARCH	83	10	.33

Pond no. 2

Table-222
Showing daily and monthly fluctuation of body weight.

(Labeo rohita) Rui				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	3	##	##
	MAY	5	2	.06
	JUNE	8	3	.10
	JULY	13	5	.16
	AUGUST	20	7	.23
	SEPTEMBER	29	9	.30
	OCTOBER	42	13	.43
	NOVEMBER	50	8	.26
	DECEMBER	57	7	.23
	JANUARY	63	6	.20
	FEBRUARY	71	8	.26
	MARCH	80	9	.30
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	4	##	##
	MAY	6	2	.06
	JUNE	9	3	.10
	JULY	13	4	.13
	AUGUST	19	6	.20
	SEPTEMBER	27	8	.26
	OCTOBER	42	15	.50
	NOVEMBER	51	9	.30
	DECEMBER	58	7	.23
	JANUARY	63	5	.16
	FEBRUARY	71	8	.26
	MARCH	82	11	.36

Pond no. 3

Table-223
Showing daily and monthly fluctuation of body weight.

(Labeo rohita) Rui				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	6	##	##
	MAY	14	8	.26
	JUNE	25	11	.36
	JULY	40	15	.50
	AUGUST	69	29	.96
	SEPTEMBER	103	34	1.13
	OCTOBER	141	38	1.26
	NOVEMBER	163	22	.73
	DECEMBER	176	13	.43
	JANUARY	185	9	.30
	FEBRUARY	205	20	.66
	MARCH	230	25	.83
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	7	##	##
	MAY	16	9	.30
	JUNE	29	13	.43
	JULY	47	18	.60
	AUGUST	74	27	.90
	SEPTEMBER	106	32	1.06
	OCTOBER	143	37	1.23
	NOVEMBER	161	18	.60
	DECEMBER	173	12	.40
	JANUARY	181	8	.26
	FEBRUARY	196	15	.50
	MARCH	218	22	.73

Pond no. 4

Table-224
Showing daily and monthly fluctuation of body weight.

(*Labeo rohita*) Rui				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	5	# #	# #
	MAY	12	7	.23
	JUNE	24	12	.40
	JULY	40	16	.53
	AUGUST	68	28	.93
	SEPTEMBER	101	33	1.10
	OCTOBER	140	39	1.30
	NOVEMBER	163	23	.76
	DECEMBER	179	16	.53
	JANUARY	188	9	.30
	FEBRUARY	207	19	.63
	MARCH	235	28	.93
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	6	# #	# #
	MAY	14	8	.26
	JUNE	26	12	.40
	JULY	42	16	.53
	AUGUST	70	28	.93
	SEPTEMBER	102	32	1.06
	OCTOBER	138	36	1.20
	NOVEMBER	161	23	.76
	DECEMBER	173	12	.40
	JANUARY	181	8	.26
	FEBRUARY	204	23	.76
	MARCH	237	33	1.10

Pond no. 5

Table-225
Showing daily and monthly fluctuation of body weight.

(*Labeo rohita*) Rui				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	7	# #	# #
	MAY	19	12	.40
	JUNE	37	18	.60
	JULY	62	25	.83
	AUGUST	100	38	1.26
	SEPTEMBER	141	41	1.36
	OCTOBER	188	47	1.56
	NOVEMBER	216	28	.93
	DECEMBER	232	16	.53
	JANUARY	244	12	.40
	FEBRUARY	266	22	.73
	MARCH	301	35	1.16
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	7	# #	# #
	MAY	17	10	.33
	JUNE	32	15	.50
	JULY	53	21	.70
	AUGUST	86	33	1.10
	SEPTEMBER	124	38	1.26
	OCTOBER	166	42	1.40
	NOVEMBER	188	22	.73
	DECEMBER	203	15	.50
	JANUARY	214	11	.36
	FEBRUARY	232	18	.60
	MARCH	258	26	.86

Pond no. 6

Table-226
Showing daily and monthly fluctuation of body weight.

(Labeo rohita) Rui				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	7	# #	# #
	MAY	18	11	.36
	JUNE	34	16	.53
	JULY	59	25	.83
	AUGUST	94	35	1.16
	SEPTEMBER	134	40	1.33
	OCTOBER	179	45	1.50
	NOVEMBER	206	27	.90
	DECEMBER	221	15	.50
	JANUARY	233	12	.40
	FEBRUARY	251	18	.60
	MARCH	280	29	.96
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	7	# #	# #
	MAY	19	12	.40
	JUNE	36	17	.56
	JULY	62	26	.86
	AUGUST	97	35	1.16
	SEPTEMBER	137	40	1.33
	OCTOBER	184	47	1.56
	NOVEMBER	212	28	.93
	DECEMBER	228	16	.53
	JANUARY	241	13	.43
	FEBRUARY	260	19	.63
	MARCH	291	31	1.03

Pond no. 7

Table-227
Showing daily and monthly fluctuation of body weight.

(Labeo rohita) Rui				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	7	##	##
	MAY	20	13	.43
	JUNE	40	20	.66
	JULY	66	26	.86
	AUGUST	106	40	1.33
	SEPTEMBER	151	45	1.50
	OCTOBER	201	50	1.66
	NOVEMBER	227	26	.86
	DECEMBER	244	17	.56
	JANUARY	257	13	.43
	FEBRUARY	287	30	1.00
	MARCH	335	48	1.6
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	6	##	##
	MAY	21	15	.50
	JUNE	43	22	.73
	JULY	71	28	.93
	AUGUST	116	45	1.50
	SEPTEMBER	164	48	1.60
	OCTOBER	214	50	1.66
	NOVEMBER	242	28	.93
	DECEMBER	258	16	.53
	JANUARY	272	14	.46
	FEBRUARY	300	28	.93
	MARCH	338	38	1.26

Table-228
Showing initial weight and final weight of Rui in different ponds in two years studied period.

YEAR	POND-1		POND-2		POND-3		POND-4		POND-5		POND-6		POND-7	
	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)
FIRST YEAR	3	85	3	80	6	230	5	235	7	301	6	280	7	335
SECOND YEAR	4	83	4	82	7	218	6	237	7	258	7	291	6	338

Mrigal

Pond no. 1

Table-229
Showing daily and monthly fluctuation of body weight.

(Cirrhinus mrigala) Mrigal				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	4	##	##
	MAY	9	5	.16
	JUNE	17	8	.26
	JULY	28	11	.36
	AUGUST	44	16	.53
	SEPTEMBER	63	19	.63
	OCTOBER	85	22	.73
	NOVEMBER	98	13	.43
	DECEMBER	106	8	.26
	JANUARY	111	5	.16
	FEBRUARY	120	9	.30
	MARCH	132	12	.40
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	5	##	##
	MAY	9	4	.13
	JUNE	16	7	.23
	JULY	26	10	.33
	AUGUST	31	15	.50
	SEPTEMBER	49	18	.60
	OCTOBER	72	23	.76
	NOVEMBER	86	14	.46
	DECEMBER	95	9	.30
	JANUARY	101	6	.20
	FEBRUARY	111	10	.33
	MARCH	125	14	.46

Pond no. 2

Table-230
Showing daily and monthly fluctuation of body weight.

(Cirrhinus mrigala) Mrigal				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	3	# #	# #
	MAY	7	4	.13
	JUNE	13	6	.20
	JULY	21	8	.26
	AUGUST	32	11	.36
	SEPTEMBER	48	16	.53
	OCTOBER	66	18	.60
	NOVEMBER	75	9	.30
	DECEMBER	81	6	.20
	JANUARY	86	5	.16
	FEBRUARY	94	8	.26
	MARCH	107	13	.43
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	4	# #	# #
	MAY	8	4	.13
	JUNE	15	7	.23
	JULY	23	8	.26
	AUGUST	35	12	.40
	SEPTEMBER	50	15	.50
	OCTOBER	69	19	.63
	NOVEMBER	79	10	.33
	DECEMBER	85	6	.20
	JANUARY	90	5	.16
	FEBRUARY	100	10	.33
	MARCH	113	13	.43

Pond no. 3

Table-231
Showing daily and monthly fluctuation of body weight.

(*Cirrhinus mrigala*) Mrigal				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	6	# #	# #
	MAY	18	12	.40
	JUNE	43	25	.83
	JULY	79	36	1.20
	AUGUST	115	39	1.30
	SEPTEMBER	154	44	1.46
	OCTOBER	198	49	1.63
	NOVEMBER	247	31	1.03
	DECEMBER	278	26	.86
	JANUARY	304	20	.66
	FEBRUARY	335	31	1.03
	MARCH	389	54	1.80
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	7	# #	# #
	MAY	20	13	.43
	JUNE	44	24	.80
	JULY	77	33	1.10
	AUGUST	118	41	1.36
	SEPTEMBER	161	43	1.43
	OCTOBER	213	52	1.73
	NOVEMBER	243	30	1
	DECEMBER	270	27	.90
	JANUARY	291	21	.70
	FEBRUARY	319	28	.93
	MARCH	360	41	1.36

Pond no. 4

Table-232
Showing daily and monthly fluctuation of body weight.

(Cirrhinus mrigala) Mrigal				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	6	##	##
	MAY	20	14	.46
	JUNE	46	26	.86
	JULY	76	30	1
	AUGUST	116	40	1.33
	SEPTEMBER	161	45	1.50
	OCTOBER	211	50	1.66
	NOVEMBER	240	29	.96
	DECEMBER	266	26	.86
	JANUARY	286	20	.66
	FEBRUARY	319	33	1.10
	MARCH	367	48	1.60
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	7	##	##
	MAY	22	15	.50
	JUNE	44	22	.73
	JULY	75	31	1.03
	AUGUST	114	39	1.30
	SEPTEMBER	156	42	1.40
	OCTOBER	208	52	1.73
	NOVEMBER	236	28	.93
	DECEMBER	260	24	.80
	JANUARY	282	22	.73
	FEBRUARY	317	35	1.16
	MARCH	370	53	1.76

Pond no. 5

Table-233
Showing daily and monthly fluctuation of body weight.

(Cirrhinus mrigala) Mrigal				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	6	# #	# #
	MAY	19	13	.43
	JUNE	45	26	.86
	JULY	80	35	1.16
	AUGUST	122	42	1.40
	SEPTEMBER	173	51	1.70
	OCTOBER	230	57	1.90
	NOVEMBER	266	36	1.20
	DECEMBER	295	29	.96
	JANUARY	320	25	.83
	FEBRUARY	358	38	1.26
	MARCH	401	43	1.43
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	7	# #	# #
	MAY	19	12	.40
	JUNE	43	24	.80
	JULY	78	35	1.16
	AUGUST	121	43	1.43
	SEPTEMBER	169	48	1.60
	OCTOBER	224	55	1.83
	NOVEMBER	261	37	1.23
	DECEMBER	291	30	1
	JANUARY	317	26	.86
	FEBRUARY	352	35	1.16
	MARCH	392	40	1.33

Pond no. 6

Table-234
Showing daily and monthly fluctuation of body weight.

(*Cirrhinus mrigala*) Mrigal				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	7	# #	# #
	MAY	20	13	.43
	JUNE	45	25	.83
	JULY	78	33	1.10
	AUGUST	120	42	1.40
	SEPTEMBER	166	46	1.53
	OCTOBER	220	54	1.80
	NOVEMBER	258	38	1.26
	DECEMBER	287	29	.96
	JANUARY	311	24	.80
	FEBRUARY	347	36	1.20
	MARCH	390	43	1.43
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	6	# #	# #
	MAY	20	14	.46
	JUNE	46	26	.86
	JULY	78	32	1.06
	AUGUST	123	45	1.50
	SEPTEMBER	171	48	1.60
	OCTOBER	226	55	1.83
	NOVEMBER	261	35	1.16
	DECEMBER	289	28	.93
	JANUARY	314	25	.83
	FEBRUARY	352	38	1.26
	MARCH	403	51	1.70

Pond no. 7

Table-235
Showing daily and monthly fluctuation of body weight.

(Cirrhinus mrigala) Mrigal				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL '98-MARCH '99	APRIL	7	# #	# #
	MAY	22	15	.50
	JUNE	49	27	.90
	JULY	82	33	1.10
	AUGUST	131	49	1.63
	SEPTEMBER	185	54	1.80
	OCTOBER	245	60	2
	NOVEMBER	281	36	1.20
	DECEMBER	311	30	1
	JANUARY	337	26	.86
	FEBRUARY	377	40	1.33
	MARCH	435	58	1.93
SECOND YEAR APRIL '99-MARCH, 2000	APRIL	6	# #	# #
	MAY	19	13	.43
	JUNE	47	28	.93
	JULY	82	35	1.16
	AUGUST	130	48	1.60
	SEPTEMBER	185	55	1.83
	OCTOBER	245	60	2
	NOVEMBER	287	42	1.40
	DECEMBER	320	33	1.10
	JANUARY	345	25	.83
	FEBRUARY	383	38	1.26
	MARCH	425	58	1.93

Table-236
Showing initial weight and final weight of Mrigal in different ponds in two years studied period.

YEAR	POND-1		POND-2		POND-3		POND-4		POND-5		POND-6		POND-7	
	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)
FIRST YEAR	4	132	3	107	6	389	6	367	6	401	7	390	7	435
SECOND YEAR	5	125	4	113	7	360	7	370	7	392	6	403	6	425

Carpio

Pond no. 1

Table-237
Showing daily and monthly fluctuation of body weight.

(*Cyprinus carpio*) Carpio				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	6	# #	# #
	MAY	11	5	.16
	JUNE	19	8	.26
	JULY	32	13	.43
	AUGUST	57	25	.83
	SEPTEMBER	92	35	1.16
	OCTOBER	112	20	.66
	NOVEMBER	129	17	.56
	DECEMBER	139	10	.33
	JANUARY	146	7	.23
	FEBRUARY	156	10	.33
	MARCH	171	15	.80
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	7	# #	# #
	MAY	13	6	.20
	JUNE	21	8	.26
	JULY	36	15	.50
	AUGUST	64	28	.93
	SEPTEMBER	97	33	1.10
	OCTOBER	119	22	.73
	NOVEMBER	139	20	.66
	DECEMBER	148	9	.30
	JANUARY	154	6	.20
	FEBRUARY	165	11	.36
	MARCH	185	20	.66

Pond no. 2

Table-238
Showing daily and monthly fluctuation of body weight.

(Cyprinus carpio) Carpio				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL '98-MARCH'99	APRIL	6	# #	# #
	MAY	11	5	.16
	JUNE	19	8	.26
	JULY	32	13	.43
	AUGUST	58	26	.86
	SEPTEMBER	89	31	1.03
	OCTOBER	109	20	.66
	NOVEMBER	125	16	.53
	DECEMBER	134	9	.30
	JANUARY	140	6	.20
	FEBRUARY	154	14	.46
	MARCH	175	21	.70
SECOND YEAR APRIL '99-MARCH, 2000	APRIL	7	# #	# #
	MAY	13	6	.20
	JUNE	21	9	.30
	JULY	33	12	.40
	AUGUST	61	28	.93
	SEPTEMBER	91	30	1.00
	OCTOBER	112	21	.70
	NOVEMBER	131	19	.63
	DECEMBER	143	12	.40
	JANUARY	151	8	.26
	FEBRUARY	163	12	.40
	MARCH	179	16	.53

Pond no. 3

Table-239
Showing daily and monthly fluctuation of body weight.

(*Cyprinus carpio*) Carpio				
YEAR	MONTH	INT. AVG. WT. (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	6	# #	# #
	MAY	21	15	.50
	JUNE	52	31	1.03
	JULY	89	37	1.23
	AUGUST	134	45	1.50
	SEPTEMBER	194	60	2
	OCTOBER	260	66	2.20
	NOVEMBER	313	53	1.76
	DECEMBER	347	34	1.13
	JANUARY	375	28	.93
	FEBRUARY	415	40	1.33
	MARCH	480	65	2.16
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	5	# #	# #
	MAY	19	14	.46
	JUNE	49	30	1.00
	JULY	84	35	1.16
	AUGUST	127	43	1.43
	SEPTEMBER	185	58	1.93
	OCTOBER	251	66	2.20
	NOVEMBER	306	55	1.83
	DECEMBER	339	33	1.10
	JANUARY	369	30	1.00
	FEBRUARY	413	44	1.46
	MARCH	470	57	1.90

Pond no. 4

Table-240
Showing daily and monthly fluctuation of body weight.

(Cyprinus carpio) Carpio				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	5	# #	# #
	MAY	20	15	.50
	JUNE	50	30	1.00
	JULY	88	38	1.26
	AUGUST	136	48	1.60
	SEPTEMBER	202	66	2.20
	OCTOBER	272	70	2.33
	NOVEMBER	330	58	1.93
	DECEMBER	365	35	1.16
	JANUARY	397	32	1.06
	FEBRUARY	437	40	1.33
	MARCH	490	53	1.76
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	6	# #	# #
	MAY	22	16	.53
	JUNE	50	28	.93
	JULY	87	37	1.23
	AUGUST	136	49	1.63
	SEPTEMBER	201	65	2.16
	OCTOBER	273	72	2.40
	NOVEMBER	333	60	2.00
	DECEMBER	369	36	1.20
	JANUARY	399	30	1.00
	FEBRUARY	437	38	1.26
	MARCH	488	51	1.70

Pond no. 5

Table-241
Showing daily and monthly fluctuation of body weight.

	(Cyprinus carpio) Carpio			
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	7	##	##
	MAY	27	20	.66
	JUNE	69	42	1.40
	JULY	119	50	1.66
	AUGUST	178	59	1.96
	SEPTEMBER	248	70	2.33
	OCTOBER	313	65	2.16
	NOVEMBER	361	48	1.60
	DECEMBER	391	30	1.00
	JANUARY	419	28	.93
	FEBRUARY	464	45	1.50
	MARCH	527	63	2.10
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	5	##	##
	MAY	23	18	.60
	JUNE	63	40	1.33
	JULY	114	51	1.70
	AUGUST	170	56	1.86
	SEPTEMBER	240	70	2.33
	OCTOBER	303	63	2.10
	NOVEMBER	345	42	1.40
	DECEMBER	373	28	.93
	JANUARY	398	25	.83
	FEBRUARY	441	43	1.43
	MARCH	503	62	2.06

Pond no. 6

Table-242
Showing daily and monthly fluctuation of body weight.

(Cyprinus carpio) Carpio				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL'98-MARCH'99	APRIL	6	##	##
	MAY	25	19	.63
	JUNE	63	38	1.26
	JULY	113	50	1.66
	AUGUST	168	55	1.83
	SEPTEMBER	239	71	2.36
	OCTOBER	304	65	2.16
	NOVEMBER	344	40	1.33
	DECEMBER	373	29	.96
	JANUARY	398	25	.83
	FEBRUARY	444	46	1.53
	MARCH	508	64	2.13
SECOND YEAR APRIL'99-MARCH, 2000	APRIL	7	##	##
	MAY	25	18	.60
	JUNE	61	36	1.20
	JULY	109	48	1.60
	AUGUST	165	56	1.86
	SEPTEMBER	235	70	2.33
	OCTOBER	298	63	2.10
	NOVEMBER	339	41	1.36
	DECEMBER	369	30	1.00
	JANUARY	395	26	.86
	FEBRUARY	440	45	1.50
	MARCH	506	66	2.20

Pond no. 7

Table-243
Showing daily and monthly fluctuation of body weight.

(Cyprinus carpio) Carpio				
YEAR	MONTH	INT. WT. OF FISH (gm)	INCREASE WT. (gm)	DAILY GROWTH (gm)
FIRST YEAR APRIL '98-MARCH'99	APRIL	7	##	##
	MAY	29	22	.73
	JUNE	54	25	.83
	JULY	98	44	1.46
	AUGUST	163	65	2.16
	SEPTEMBER	258	95	3.16
	OCTOBER	373	115	3.83
	NOVEMBER	463	90	3.00
	DECEMBER	519	56	1.86
	JANUARY	547	28	.93
	FEBRUARY	605	58	1.93
	MARCH	690	85	2.83
SECOND YEAR APRIL '99-MARCH, 2000	APRIL	6	##	##
	MAY	26	20	.66
	JUNE	49	23	.76
	JULY	89	40	1.33
	AUGUST	149	60	2.00
	SEPTEMBER	239	90	3.00
	OCTOBER	344	105	3.50
	NOVEMBER	429	85	2.83
	DECEMBER	484	55	1.83
	JANUARY	514	30	1.00
	FEBRUARY	574	60	2.00
	MARCH	658	84	2.80

Table-244
Showing initial weight and final weight of Carpio in different ponds in two years studied period.

YEAR	POND-1		POND-2		POND-3		POND-4		POND-5		POND-6		POND-7	
	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)	Initial Weight (gm)	Final Weight (gm)
FIRST YEAR	6	171	6	175	6	480	5	490	7	527	6	508	7	690
SECOND YEAR	7	185	7	179	5	470	6	488	5	503	7	506	6	658

Pond no. 1

Table-245 : Population status of fishes in pond-1 during study period

Year	Fish species	Number of stocked fish	Number of harvested fish		Number unfished	Mortality rate (%)		Average weight (gm)	Weight of harvested (kg)	Total weight (kg)	Total production / ha (kg)
			Num.	%		Num.	%				
FIRST YEAR APRIL '98-MARCH'99	SILVER	1100	935	85	88	77	7	180	168.30	198.00	495.00
	CATLA	1100	880	80	55	165	15	90	79.20	99.00	232.94
	RUI	1100	913	83	66	121	11	85	77.60	93.50	228.23
	MRIGAL	1100	792	72	198	110	10	132	104.54	145.20	307.47
	CARPIO	1100	770	70	198	132	12	171	131.36	188.10	386.35
		5500	4290		605	605		131.60	561.00	723.80	1650.00
SECOND YEAR APRIL'99-MARCH, 2000	SILVER	825	718	87	54	53	5	178	127.85	146.85	376.02
	CATLA	825	676	82	40	109	13	80	54.08	66	159.05
	RUI	1100	880	80	110	110	10	83	73.04	91.3	214.82
	MRIGAL	1375	1072	78	75	228	16	125	134.00	171.87	394.11
	CARPIO	1375	1018	74	289	68	5	185	178.15	254.37	523.97
	Total	5500	4360		568	572		449.60	567.12	730.39	1668

Pond no. 2

Table-246 Population status of fishes in pond-2 during study period

Year	Fish species	Number of stocked fish	Number of harvested fish		Number unfished	Mortality rate (%)		Average weight (gm)	Weight of harvested (kg)	Total weight (kg)	Total production / ha (kg)
			NUM.	%		NUM.	%				
FIRST YEAR APRIL'98-MARCH'99	SILVER	1120	940.00	84	67.2	112	10	191	179.54	213.92	512.97
	CATLA	1120	884.00	79	56	179	16	86	76.02	96.32	217.20
	RUI	1120	940.8	84	44	134	12	80	75.2	89.6	214.85
	MRIGAL	1120	828.00	74	168	123	11	107	88.54	119.84	252.97
	CARPIO	1120	806	72	168	145	13	175	141.05	196	403
	Total	5600	4398		503	693			560.35	715.68	1601.00
SECOND YEAR APRIL'99-MARCH, 2000	SILVER	840	731	87	58	51	6	185	135.23	155.4	386.37
	CATLA	840	689	82	58	93	11	87	60	73.08	171.42
	RUI	1120	975	87	55	90	8	82	80	91.84	228.57
	MRIGAL	1400	1092	78	210	98	7	113	123.5	158.20	352.85
	CARPIO	1400	980	70	308	112	8	179	175.27	250.6	500.77
	Total	5600	4447		729	424			574.00	2737.44	1640

Pond no. 3

Table-247 Population status of fishes in pond-3 during study period

Year	Fish species	Number of stocked fish	Number of harvested fish		Number unfished	Mortality rate (%)		Average weight (gm)	Weight of harvested (kg)	Total weight (kg)	Total production / ha (kg)
			NUM.	%		NUM.	%				
FIRST YEAR APRIL'98-MARCH'99	SILVER	1160	940	81	24	198	17	611	574.34	708.76	1595.38
	CATLA	1160	894	77	93	174	15	311	278.03	360.76	772.30
	RUI	1160	905	78	128	128	11	230	208.15	266.8	578.19
	MRIGAL	1160	917	79	128	116	10	389	356.56	451.24	990.44
	CARPIO	1160	905	78	128	128	11	480	434.40	556.8	1206.66
	Total	5800	4561		501	744	8	863	1851.48	4339.7	5143.00
SECOND YEAR APRIL'99-MARCH, 2000	SILVER	870	722	83	44	104	12	614	443.38	534.18	1231.60
	CATLA	870	723	83	35	112	13	301	217.62	261.87	604.50
	RUI	1160	928	80	139	93	7	218	202.30	252.80	561.94
	MRIGAL	1450	1175	81	188	87	6	360	423.00	522	1175
	CARPIO	1450	1131	78	138	181	16	470	531.57	681.50	1476.58
	Total	5800	4741		566	493		915.6	1818	2252.35	5050

Pond no. 4

Table-248 Population status of fishes in pond-4 during study period

Year	Fish species	Number of stocked fish	Number of harvested fish		Number unfished	Mortality rate (%)		Average weight (gm)	Weight of harvested (kg)	Total weight (kg)	Total production / ha (kg)
			NUM.	%		NUM.	%				
FIRST YEAR APRIL'98-MARCH'99	SILVER	1224	1040	85	38	146	12	648	674.68	793.15	1775.97
	CATLA	1224	930	76	74	220	18	320	297.60	391.68	783.15
	RUI	1224	991	81	86	147	12	235	232.88	287.64	612.84
	MRIGAL	1224	881	72	159	184	15	367	323.32	449.20	850.84
	CARPIO	1224	856	70	233	135	11	490	419.40	599.76	1103.68
	Total	6120	4698	85	590	832			1947.8 8	2521.45	5126
SECOND YEAR APRIL'99-MARCH, 2000	SILVER	918	707	77	137	74	8	641	453.48	588.43	1193.36
	CATLA	918	716	78	101	101	11	333	238.42	305.69	627.42
	RUI	1224	1040	79	123	61	5	237	246.48	290.08	648.63
	MRIGAL	1530	1361	89	31	138	9	370	503.57	566.10	1325.18
	CARPIO	1530	1102	72	275	153	10	488	537.77	746.64	1415.18
	Total	6120	5001		605	514			1979.4	2496.94	5208

Pond no. 5

Table-249 Population status of fishes in pond-5 during study period

Year	Fish species	Number of stocked fish	Number of harvested fish		Number unfished	Mortality rate (%)		Average weight (gm)	Weight of harvested (kg)	Total weight (kg)	Total production / ha (kg)
			NUM.	%		NUM.	%				
FIRST YEAR APRIL'98-MARCH'99	SILVER	1200	1020	85	72	108	7	802	817.59	962.4	2151.55
	CATLA	1200	1008	84	108	84	7	340	342.72	408	901.89
	RUI	1200	960	81	132	96	8	301	288.96	361.20	760.42
	MRIGAL	1200	936	78	48	216	18	401	375.33	481.20	987.71
	CARPIO	1200	888	74	108	204	17	527	467.97	704	1231.50
	Total	6000	4812		468	708		875	2292.52	5252.4	6033
SECOND YEAR APRIL'99-MARCH, 2000	SILVER	975	868	89	48	59	6	796	690.92	776.10	1818.21
	CATLA	975	848	87	39	88	9	316	267.96	308.1	705.15
	RUI	1300	1079	83	130	91	7	258	278.38	335.40	732.57
	MRIGAL	1625	1218	75	195	212	13	392	477.45	637	1256.44
	CARPIO	1625	1235	76	130	260	16	503	621.20	817.37	1634.73
	Total	6500	5262		597	641		901.00	2335.86	6349.06	6147

Pond no. 6

Table-250 Population status of fishes in pond-6 during study period

Year	Fish species	Number of stocked fish	Number of harvested fish		Number unfished	Mortality rate (%)		Average weight (gm)	Weight of harvested (kg)	Total weight (kg)	Total production / ha (kg)
			NUM.	%		NUM.	%				
FIRST YEAR APRIL '98-MARCH'99	SILVER	1200	1020	85	48	132	11	813	829.37	975.6	2241.54
	CATLA	1200	960	80	60	180	15	308	295.68	369.6	799.13
	RUI	1200	936	78	120	144	12	280	262.08	336	708.32
	MRIGAL	1200	864	72	144	192	16	390	336.96	468	910.70
	CARPIO	1200	840	70	120	240	20	508	426.72	609.6	1153.29
	Total	6000	4620		492	880		916.80	2150.81	2758.8	5813
SECOND YEAR APRIL'99-MARCH, 2000	SILVER	900	783	87	45	72	8	855	669.46	769.5	1809.35
	CATLA	900	702	78	108	90	10	320	224.64	288.00	607.13
	RUI	1200	1008	84	96	96	8	291	293.32	349.20	792.75
	MRIGAL	1500	1095	73	240	165	11	403	441.28	604.50	1192.64
	CARPIO	1500	1080	72	255	165	11	506	545.79	759.00	1475.10
	Total	6000	4710		979	577		915.60	2174.49	2770.20	5877

Pond no. 7

Table-251 Population status of fishes in pond-7 during study period

Year	Fish species	Number of stocked fish	Number of harvested fish		Number unfished	Mortality rate (%)		Average weight (gm)	Weight of harvested (kg)	Total weight (kg)	Total production / ha (kg)
			NUM.	%		NUM.	%				
FIRST YEAR APRIL'98-MARCH'99	SILVER	1040	863	83	115	62	6	901	777.56	937.04	2286.94
	CATLA	1040	842	81	63	135	13	370	311.54	384.80	916.29
	RUI	1040	780	75	146	114	11	335	261.30	348.4	768.52
	MRIGAL	1040	821	79	136	83	8	435	357.13	452.40	1050.38
	CARPIO	1040	832	80	94	114	11	690	573.87	717.6	1687.85
	Total	5200	4138		554	508		964.40	2281.40	2840.24	6710
SECOND YEAR APRIL'99-MARCH, 2000	SILVER	780	679	87	46	55	7	932	633.11	726.96	1862.08
	CATLA	780	648	83	69	63	8	380	246.24	296.40	724.23
	RUI	1040	842	81	126	72	7	338	284.59	351.52	837.02
	MRIGAL	1300	1040	80	117	143	11	425	434.72	552.5	1278.58
	CARPIO	1300	1014	78	156	130	10	658	667.21	855.4	1962.38
	Total	5200	4229		521	480		1020	2254.20	5730.52	6630

Table-252
Total production per pond and per hactere in two years (April'1998 to March, 2000).

Pond	First Year April'98-March'99		Second Year April'99-March, 2000	
	Production/Pond/Year (kg)	Production/ha/Year (kg)	Production/Pond/Year (kg)	Production/ha/Year (kg)
Pond-1	561.00	1650.00	567.12	1668
Pond-2	560.35	1601	574.00	1640
Pond-3	1851.48	5143	1818	5050
Pond-4	1947.88	5126	1979.04	5208
Pond-5	2292.52	6033	2335.86	6147
Pond-6	2150.81	5813	2174.49	5877
Pond-7	2281.40	6710	2254.20	6630

Table-253
Showing Moisture content in different feed samples (mg/100 gm).

Semi-Solid	Liquid	Laboratory Dry	Laboratory Dry
Sample-1	Sample-2	Sample-3	Standard Sample Jamuna
58.96±0.29	81.31±0.24	10.37±0.09	10.02±0.12

Table-254
Showing Moisture content in commercially dry form of different feed samples (mg/100 gm).

Sample-1	Sample-2	Sample-3	Sample-4
00	00	00	00

Table-255
Showing Ash content in different feed samples (mg/100 gm).

Semi-Solid	Liquid	Laboratory Dry	Laboratory Dry
Sample-1	Sample-2	Sample-3	Control (Krishika)
6.51±0.24	3.28±0.03	32.35±0.07	9.94±0.12

Table-256
Showing Ash content in commercially dry form of different feed samples (mg/100 gm).

Sample-1	Sample-2	Sample-3	Sample-4
15.36	18.09	11.04	17.54

Table-257
Showing Crude Fibre content in different feed samples (mg/100 gm).

Semi-Solid	Liquid	Laboratory Dry	Laboratory Dry
Sample-1	Sample-2	Sample-3	Standard Sample Jamuna
1.88±0.33	0.37±0.27	10.28±0.41	1.80±0.42

Table-258
Showing Crude Fibre content in commercially dry form of different feed samples (mg/100 gm).

Sample-1	Sample-2	Sample-3	Sample-4
4.58	11.28	5.40	4.80

Table-259
Showing Protein content in different feed samples (mg/100 gm).

Semi-Solid	Liquid	Laboratory Dry	Laboratory Dry
Sample-1	Sample-2	Sample-3	Standard Sample Jamuna
12.48±0.16	1.82±0.19	9.10±0.08	19.01±0.17

Table-260
Showing Protein content in commercially dry form of different feed samples (mg/100 gm).

Sample-1	Sample-2	Sample-3	Sample-4
18.15	19.15	28.12	29.73

Table-261
Showing Fat content in different feed samples (mg/100 gm).

Semi-Solid	Liquid	Laboratory Dry	Laboratory Dry
Sample-1	Sample-2	Sample-3	Standard Sample Jamuna
2.82±0.18	0.85±0.11	1.65±0.29	13.05±0.07

Table-262
Showing Fat content in commercially dry form of different feed samples (mg/100 gm).

Sample-1	Sample-2	Sample-3	Sample-4
5.87	7.84	9.30	8.45

Table-263
Showing Carbohydrate content in different feed samples (mg/100 gm).

Semi-Solid	Liquid	Laboratory Dry	Laboratory Dry
Sample-1	Sample-2	Sample-3	Standard Sample Jamuna
17.35±0.10	12.74±0.15	36.25±0.06	46.18±0.02

Table-264
Showing Carbohydrate content in commercially dry form of different feed samples (mg/100 gm).

Sample-1	Sample-2	Sample-3	Sample-4
42.27	47.44	51.32	68.16

Table-265
Showing Caloric content of different feed samples (K.cal.).

Semi-Solid	Liquid	Laboratory Dry	Laboratory Dry
Sample-1	Sample-2	Sample-3	Standard Sample Jamuna
144	65	196	378

Table-266
Showing Caloric content in commercially dry form of different feed samples (K.cal.).

Sample-1	Sample-2	Sample-3	Sample-4
350	218	420	347

Table-267
Showing Calcium content of different feed samples (mg/100 gm).

Semi-Solid	Liquid	Laboratory Dry	Laboratory Dry
Sample-1	Sample-2	Sample-3	Standard Sample Jamuna
295±0.39	92±0.52	290±0.40	296±0.33

Table-268
Showing Calcium content in commercially dry form of different feed samples (mg/100 gm).

Sample-1	Sample-2	Sample-3	Sample-4
718	323	307	492

Table-269
Showing Magnesium content of different feed samples (mg/100 gm).

Semi-Solid	Liquid	Laboratory Dry	Laboratory Dry
Sample-1	Sample-2	Sample-3	Standard Sample Jamuna
276±0.60	78±0.76	266±0.74	269±0.55

Table-270
Showing Magnesium content in commercially dry form of different feed samples (mg/100 gm).

Sample-1	Sample-2	Sample-3	Sample-4
672	296	253	417

Table-271
Showing Zinc content of different feed samples (mg/100 gm).

Semi-Solid	Liquid	Laboratory Dry	Laboratory Dry
Sample-1	Sample-2	Sample-3	Standard Sample Jamuna
4.78±0.03	0.55±0.06	5.13±0.09	5.57±0.44

Table-272
Showing Zinc content in commercially dry form of different feed samples (mg/100 gm).

Sample-1	Sample-2	Sample-3	Sample-4
11.64	5.72	5.37	2.94

Table-273
Showing Iron content of different feed samples (mg/100 gm).

Semi-Solid	Liquid	Laboratory Dry	Laboratory Dry
Sample-1	Sample-2	Sample-3	Standard Sample Jamuna
8.90±0.11	2.77±0.08	7.69±0.10	9.75±0.06

Table-274
Showing Iron content in commercially dry form of different feed samples (mg/100 gm).

Sample-1	Sample-2	Sample-3	Sample-4
21.68	8.57	9.92	14.82

Table-275
Showing Copper content of different feed samples (mg/100 gm).

Semi-Solid	Liquid	Laboratory Dry	Laboratory Dry
Sample-1	Sample-2	Sample-3	Standard Sample Jamuna
0.84±0.03	0.16±0.01	0.97±0.07	0.90±0.08

Table-276
Showing Copper content in commercially dry form of different feed samples (mg/100 gm).

Sample-1	Sample-2	Sample-3	Sample-4
2.04	1.08	.92	.85

Table-277
Pond wise minimum and maximum variation in population abundance of Zooplankton during two years studied period.

Sample	Pond	First Year April'98-March'99 Individual/liter	Second Year April'99-March, 2000 Individual/liter
Sample-1	Pond-1	9030-11908	8056-10780
	Pond-2	8800-11781	7189-10715
Sample-2	Pond-3	14218-24323	14001-23908
	Pond-4	11787-21507	9804-19711
Sample-3	Pond-5	10444-18860	11581-21856
	Pond-6	8110-16911	10799-19018
Sample-4	Pond-7	10011-20132	11577-23370

Table-278
Pond wise peak abundance of Zooplankton in two years studied period.

Sample	Pond	First Year April'98-March'99 (month)	Second Year April'99-March, 2000 (month)
Sample-1	Pond-1	June'98	May'99
	Pond-2	August'98	August'99
Sample-2	Pond-3	June'98	November'99
	Pond-4	June'98	June'99
Sample-3	Pond-5	June'98	May'99
	Pond-6	June'98	June'99
Sample-4	Pond-7	May'98	June'99

Table-279
Pond wise minimum and maximum variation in population abundance of Rotifera during two years studied period.

Sample	Pond	First Year April'98-March'99	Second Year April'99-March, 2000
		Individual/liter	Individual/liter
Feed Sample-1	Pond-1	1323-3693	1384-2684
	Pond-2	733-3461	1196-3013
Feed Sample-2	Pond-3	3100-8180	3312-9117
	Pond-4	2100-5877	1818-6188
Feed Sample-3	Pond-5	1800-8809	1418-8755
	Pond-6	1834-4203	1991-6598
Feed Sample-4	Pond-7	1184-6125	2244-5750

Table-280
Pond wise minimum and maximum variation in population abundance of Cladocera during two years studied period.

Feed Sample	Pond	First Year April'98-March'99	Second Year April'99-March, 2000
		Individual/liter	Individual/liter
Feed Sample-1	Pond-1	978-3031	903-2033
	Pond-2	965-3213	835-2830
Feed Sample-2	Pond-3	2107-4800	2007-5633
	Pond-4	1288-3866	721-4118
Feed Sample-3	Pond-5	1603-3910	1913-4130
	Pond-6	1313-3633	1708-4380
Feed Sample-4	Pond-7	1012-6108	2015-4118

Table-281
Pond wise peak abundance with rational percentage of Cladocera during two years study period.

Sample	Pond	First Year April'98-March'99 (%) month	Second Year April'99-March, 2000 (%) month
Sample-1	Pond-1	January'99 27.71%	February'2000 19.25%
	Pond-2	January'99 28.33%	October'99 27.44%
Sample-2	Pond-3	July'98 24.72%	July'99 23.66%
	Pond-4	June'98 17.97%	June'99 20.89%
Sample-3	Pond-5	July'98 24.79%	July'99 21.79%
	Pond-6	July'98 27.27%	December'99 24.91%
Sample-4	Pond-7	December'98 37.34%	February'2000 21.67%

Table-282
Pond wise minimum and maximum variation with rational percentage in population abundance of Copepoda during two years studied period.

Sample	Pond	First Year April'98-March'99	Peak (%) month	Second Year April'99-March, 2000	Peak (%) month
		Individual/liter		Individual/liter	
Sample-1	Pond-1	687-3030	November'98 23.12%	933-2184	November'99 21.59%
	Pond-2	599-2818	November'98 24.24%	990-2313	September'99 24.31%
Sample-2	Pond-3	384-6255	November'98 30.96%	826-6910	November'99 28.90%
	Pond-4	581-5735	November'98 32.24%	1823-6371	July'99 35.22%
Sample-3	Pond-5	561-5003	November'98 26.58%	833-4880	October'99 31.13%
	Pond-6	630-4080	June'98 24.12%	819-3890	April'99 24.51%
Sample-4	Pond-7	2130-6517	July'98 34.65%	2131-5731	July'99 25.39%

Table-283

Pond wise minimum and maximum variation with rational percentage in population abundance of Ostracoda during two years studied period.

Sample	Pond	First Year April'98-March'99 Individual/liter	Peak (%) month	Second Year April'99-March, 2000 Individual/liter	Peak (%) month
Sample-1	Pond-1	730-2201	January'99 17.32%	667-1508	February'2000 14.24%
	Pond-2	787-2188	January'99 19.29%	318-1531	January'2000 14.82%
Sample-2	Pond-3	524-2300	December'98 12.79	618-2201	December'99 14.61%
	Pond-4	630-1933	December'98 13.50%	1003-2737	March, 2000 15.09%
Sample-3	Pond-5	700-2050	December'98 12.51%	980-2130	January'2000 13.90%
	Pond-6	536-1903	March'99 13.65%	333-2918	December'99 16.60%
Sample-4	Pond-7	1135-2837	January'99 18.68%	1133-3733	July'99 16.54%

Table-284

Pond wise minimum and maximum variation with rational percentage in population abundance of Nauplius during two years studied period.

Sample	Pond	First Year April'98-March'99	Peak (%) month	Second Year April'99-March, 2000	Peak (%) month
		Individual/liter		Individual/liter	
Sample-1	Pond-1	613-2270	January'99 17.86%	1013-2223	September'99 24.07%
	Pond-2	533-2111	September'99 20.47%	613-1933	September'99 20.32%
Sample-2	Pond-3	913-2680	June'98 11.01%	1040-2503	July'99 10.51%
	Pond-4	733-3151	June'98 14.65%	538-2809	April'99 15.30%
Sample-3	Pond-5	313-2130	January'99 13.94%	963-2680	January'2000 17.49%
	Pond-6	112-2103	December'98 15.39%	580-4200	December'99 24.35%
Sample-4	Pond-7	712-2872	March'99 15.49%	1072-4018	June'99 17.19%

Table-285

Pond wise minimum and maximum variation with rational percentage in population abundance of Protozoa during two years studied period.

Sample	Pond	First Year April'98-March'99	Peak (%) month	Second Year April'99-March, 2000	Peak (%) month
		Individual/liter		Individual/liter	
Sample-1	Pond-1	730-2913	June'98 24.46%	810-3018	August'99 29.78%
	Pond-2	811-3030	June'98 28.85%	1033-4113	August'99 38.39%
Sample-2	Pond-3	1300-8000	May'98 35.19%	770-5808	June'99 28.28%
	Pond-4	933-5842	May'98 28.21%	1071-4561	May'99 23.41%
Sample-3	Pond-5	1520-7405	June'98 37.28%	1177-8341	June'99 39.46%
	Pond-6	933-4807	May'98 29.73%	1130-3133	May'99 18.28%
Sample-4	Pond-7	917-4683	May'98 23.26%	1812-4818	May'99 23.95%

Table-286
Pond wise minimum and maximum variation of population abundance of macrobenthos during two years studied period.

Sample	Pond	First Year April'98-March'99	Second Year April'99-March, 2000
		Individual/m^2	Individual/m^2
Sample-1	Pond-1	2119-3018	1804-2730
	Pond-2	2117-2817	2271-3179
Sample-2	Pond-3	2039-6887	2056-7561
	Pond-4	1813-6317	2718-7177
Sample-3	Pond-5	2038-5833	1918-5353
	Pond-6	1834-4885	1877-5118
Sample-4	Pond-7	2928-7970	4118-9008

Table-287
Pond wise peak abundance of macrobenthos during two years studied period.

Sample	Pond	Peak Abundance	
		First Year April'98-March'99	Second Year April'99-March, 2000
Sample-1	Pond-1	April'98	June'99
	Pond-2	April'98	September'99
Sample-2	Pond-3	February'99	February'2000
	Pond-4	April'98	April'99
Sample-3	Pond-5	February'99	December'99
	Pond-6	April'98	April'99
Sample-4	Pond-7	April'98	April'99

Table-288
Pond wise peak abundance with their rational percentage of Oligochaeta during two years studied period.

Sample	Pond	First Year April'98-March'99	Second Year April'99-March, 2000
		Maximum (%)	Maximum (%)
Sample-1	Pond-1	68.58% November'98	62.8% November'99
	Pond-2	46.14% April'98	51.79% April'99
Sample-2	Pond-3	69.74% February'99	60.28% January'2000
	Pond-4	69.67% December'98	62.32% December'99
Sample-3	Pond-5	67.23% February'99	67.13% December'99
	Pond-6	56.48% January'99	64.12% February'2000
Sample-4	Pond-7	71.78% January'99	68.23% December'99

Table-289
Pond wise peak abundance of *Limnodrilus* during two years studied period.

Sample	Pond	First Year April'98-March'99 Individual/m^2	Second Year April'99-March, 2000 Individual/m^2
		Maximum	Maximum
Sample-1	Pond-1	980 September'98	815 September'99
	Pond-2	818 September'98	1037 September'99
Sample-2	Pond-3	2984 December'98	563 December'99
	Pond-4	836 December'98	577 October'99
Sample-3	Pond-5	490 January'99	431 January'2000
	Pond-6	503 January'99	771 January'2000
Sample-4	Pond-7	438 January'99	780 January'2000

Table-290
Pond wise peak abundance of Chironomid during two years studied period.

Sample	Pond	First Year April'98-March'99 Individual/m^2	Second Year April'99-March, 2000 Individual/m^2
Sample-1	Pond-1	580-1618	533-1412
	Pond-2	536-1333	610-1533
Sample-2	Pond-3	524-4003	618-3872
	Pond-4	621-3391	836-3536
Sample-3	Pond-5	509-2833	617-2590
	Pond-6	517-3133	703-2899
Sample-4	Pond-7	972-3618	1008-4713

Table-291
Pond wise peak abundance with their rational percentage of Chironomid during two years studied period.

Sample	Pond	First Year April'98-March'99	Second Year April'99-March, 2000
		Maximum (%)	Maximum (%)
Sample-1	Pond-1	40.85% April'98	55.68% April'99
	Pond-2	62.96% July'98	64.41% July'99
Sample-2	Pond-3	59.99% April'99	54.87% April'99
	Pond-4	53.68% April'98	49.27% April'99
Sample-3	Pond-5	53.60% April'98	52.84% April'99
	Pond-6	64.13% April'98	54.46% April'99
Sample-4	Pond-7	45.39% April'98	53.32% April'99

Table-292
Pond wise population abundance of Mollusca during two years studied period.

Sample	Pond	First Year April'98-March'99 Individual/m^2	Second Year April'99-March, 2000 Individual/m^2
Sample-1	Pond-1	111-513	127-612
	Pond-2	130-548	242-508
Sample-2	Pond-3	310-724	311-817
	Pond-4	217-818	198-1557
Sample-3	Pond-5	250-637	309-716
	Pond-6	219-633	308-972
Sample-4	Pond-7	369-1603	299-2507

Table-293
Pond wise peak abundance with their rational percentage of mollusca during two years studied period.

Sample	Pond	First Year April'98-March'99 (%) month	Second Year April'99-March, 2000 (%) month
Sample-1	Pond-1	21.16% March'99	25.63% March, 2000
	Pond-2	13.21% June'98	21.28% February'2000
Sample-2	Pond-3	11.92% March'99	11.08% January'2000
	Pond-4	14.82% March'99	23.18% May'99
Sample-3	Pond-5	15.51% November'98	13.69% March, 2000
	Pond-6	15.75% June'98	19.97% December'99
Sample-4	Pond-7	22.89% May'98	30.66% May'99

Table-294

Pond wise peak abundance with their rational percentage of others during two years studied period.

Sample	Pond	First Year April'98-March'99 (%) month	Second Year April'99-March, 2000 (%) month
Sample-1	Pond-1	6.99% September'98	6.5% September'99
	Pond-2	5.76% June'98	5.77% June'99
Sample-2	Pond-3	4.24% June'98	2.75% January'2000
	Pond-4	5.07% June'98	3.70% January'2000
Sample-3	Pond-5	3.12% January'99	3.61% January'2000
	Pond-6	3.70% January'99	4.80% August'99
Sample-4	Pond-7	3.40% January'99	3.77% January'2000

Table-295

Wet Weight of Planktonic Bio-mass during two years study period.

Sample	Pond	First Year April'98-March'99 (mg/l)		Second Year April'99-March, 2000 (mg/l)	
		Minimum	Maximum	Minimum	Maximum
Sample-1	Pond-1	18.30	24.51	16.59	21.57
	Pond-2	16.10	21.70	15.80	20.30
Sample-2	Pond-3	22.3	81.3	24.3	80.1
	Pond-4	20.1	77.3	28	75.1
Sample-3	Pond-5	22.7	60	20.9	58
	Pond-6	20.2	37.1	20.1	37.8
Sample-4	Pond-7	24	76	26	78

Table-296

Dry Weight of Planktonic Bio-mass during two years study period.

Sample	Pond	First Year April'98-March'99 (mg/l)		Second Year April'99-March, 2000 (mg/l)	
		Minimum	Maximum	Minimum	Maximum
Sample-1	Pond-1	2.55	4.75	2.87	4.18
	Pond-2	2.21	3.71	2.12	3.50
Sample-2	Pond-3	5.61	7.41	5.59	7.28
	Pond-4	5.23	7.11	5.14	7.10
Sample-3	Pond-5	4.02	5.90	3.92	5.90
	Pond-6	3.8	6.10	3.6	6.11
Sample-4	Pond-7	5.34	7.30	5.78	7.78

Table-297

Quantitative peak abundance of Phytoplankton, Zooplankton, Bio-mass during the studied period from April'98-March'99.

Sample	Pond	Phytoplankton (month	Zooplankton (month)	Bio-mass mg/l	
				Wet Weight	Dry weight
Sample-1	Pond-1	July'98	June'98	24.51 June'98	4.75 June'98
	Pond-2	July'98	August'98	21.70 August'98	3.71 August'98
Sample-2	Pond-3	July'98	June'98	81.30 June'98	7.41 June'98
	Pond-4	July'98	June'98	77.3 June'98	7.11 June'98
Sample-3	Pond-5	July'98	June'98	60.0 June'98	5.90 June'98
	Pond-6	July'98	June'98	37.4 June'98	6.10 June'98
Sample-4	Pond-7	July'98	May'98	76 May'98	7.30 May'98

Table-298
Daily growth rate of Silver carp in different months during April'98-March'99.

Months	Sample-1 (gm)		Sample-2 (gm)		Sample-3 (gm)		Sample-4 (gm)
	Pond-1	Pond-2	Pond-3	Pond-4	Pond-5	Pond-6	Pond-7
April	00	00	00	00	00	00	00
May	.19	.22	.58	.64	.96	1.00	1.22
June	.30	.30	.70	.76	1.33	1.36	1.83
July	.45	.41	1.29	1.38	1.48	1.45	1.90
August	.93	.83	2.09	2.16	2.54	2.61	3.22
September	1.10	.90	2.93	3	3.40	3.50	3.76
October	.67	.96	3.48	3.58	3.74	3.87	4.12
November	.60	.63	3	2.93	3.33	3.40	3.50
December	.25	.22	1.61	1.77	2.45	2.29	2.58
January	.22	.16	.77	.83	1.29	1.12	1.45
February	.37	.53	1.33	1.63	2.33	2.58	2.68
March	.54	.83	1.93	2.19	3.12	3.03	2.90

Table-299
Daily growth rate of Catla in different months during April'98-March'99.

Months	Sample-1 (gm)		Sample-2 (gm)		Sample-3 (gm)		Sample-4 (gm)
	Pond-1	Pond-2	Pond-3	Pond-4	Pond-5	Pond-6	Pond-7
April	00	00	00	00	00	00	00
May	.16	.16	.50	.50	.66	.63	.73
June	.26	.26	1.03	1.00	1.40	1.26	.83
July	.43	.43	1.23	1.26	1.66	1.66	1.46
August	.83	.86	1.50	1.60	1.96	1.83	2.16
September	1.16	1.03	2	2.20	2.33	2.36	3.16
October	.66	.66	2.20	2.33	2.16	2.16	3.83
November	.56	.53	1.76	1.93	1.60	1.33	3.00
December	.33	.30	1.13	1.16	1.00	.96	1.86
January	.23	.20	.93	1.06	.93	.83	.93
February	.33	.46	1.33	1.33	1.50	1.53	1.93
March	.80	.70	2.16	1.76	2.10	2.13	2.83

Table-300
Daily growth rate of Rui in different months during April'98-March'99.

Months	Sample-1 (gm)		Sample-2 (gm)		Sample-3 (gm)		Sample-4 (gm)
	Pond-1	Pond-2	Pond-3	Pond-4	Pond-5	Pond-6	Pond-7
April	00	00	00	00	00	00	00
May	.10	.06	.26	.23	.40	.36	.43
June	.13	.10	.36	.40	.60	.53	.66
July	.16	.16	.50	.53	.83	.83	.86
August	.26	.23	.96	.93	1.26	1.16	1.33
September	.36	.30	1.13	1.10	1.36	1.33	1.50
October	.46	.43	1.26	1.30	1.56	1.50	1.66
November	.20	.26	.73	.76	.93	.90	.86
December	.16	.23	.43	.53	.53	.50	.56
January	.16	.20	.30	.30	.40	.40	.43
February	.30	.26	.66	.63	.73	.60	1.00
March	.40	.30	.83	.93	1.16	.96	1.6

Table-301
Daily growth rate of Mrigal in different months during April'98-March'99.

Months	Sample-1 (gm)		Sample-2 (gm)		Sample-3 (gm)		Sample-4 (gm)
	Pond-1	Pond-2	Pond-3	Pond-4	Pond-5	Pond-6	Pond-7
April	00	00	00	00	00	00	00
May	.16	.13	.40	.46	.43	.43	.50
June	.26	.20	.83	.86	.86	.83	.90
July	.36	.26	1.20	1	1.16	1.10	1.10
August	.53	.36	1.30	1.33	1.40	1.40	1.63
September	.63	.53	1.46	1.50	1.70	1.53	1.80
October	.73	.60	1.63	1.66	1.90	1.80	2
November	.43	.30	1.03	.96	1.20	1.26	1.20
December	.26	.20	.86	.86	.96	.96	1
January	.16	.16	.66	.66	.83	.80	.86
February	.30	.26	1.03	1.10	1.26	1.20	1.33
March	.40	.43	1.80	1.60	1.43	1.43	1.93

Table-302

Daily growth rate of Carpio in different months during April'98-March'99.

Months	Sample-1 (gm)		Sample-2 (gm)		Sample-3 (gm)		Sample-4 (gm)
	Pond-1	Pond-2	Pond-3	Pond-4	Pond-5	Pond-6	Pond-7
April	00	00	00	00	00	00	00
May	.10	.06	.36	.40	.50	.40	.53
June	.16	.10	.73	.66	.73	.60	.80
July	.20	.20	.80	.83	.86	.80	.93
August	.30	.26	1.06	1.03	1.06	1.16	1.10
September	.36	.33	1.26	1.30	1.30	1.33	1.40
October	.46	.46	1.53	1.60	1.73	1.53	1.70
November	.26	.26	.93	1	1	.80	1.30
December	.23	.23	.56	.66	.73	.53	.86
January	.20	.20	.43	.50	.53	.36	.60
February	.23	.23	.96	1.23	1.06	1	1.20
March	.30	.40	1.50	1.66	1.60	1.53	1.96

Table-303

Final fish production/ha/yr during two years research period.

Pond	First Year April'98-March'99	Second Year April'99-March, 2000
	Production / ha / yr (kg)	Production / ha / yr (kg)
Pond-1	1650	1668
Pond-2	1601	1640
Pond-3	5143	5050
Pond-4	5126	5208
Pond-5	6033	6147
Pond-6	5813	5877
Pond-7	6710	6630

Table No. 304.

Simple Correlation (r) between Water temperature and average growth of different fish species of the pond-6 during April'99-March, 2000.

Species	Correlation (r)	Remark	t	t-value from the table
Silver	-0.67	Positively co-related	2.88	5%=2.228 1%=3.169
Catla	-0.70	Positively co-related	3.12	
Rui	-0.70	Positively co-related	3.11	
Mrigal	-0.65	Positively co-related	2.68	
Carpio	-0.68	Positively co-related	2.94	

Table No.305.

Simple Correlation (r) between Air temperature and average growth of different fish species of the pond-6 during April'99-March, 2000.

Species	Correlation (r)	Remark	t	t-value from the table
Silver	-0.69	Positively co-related	2.98	5%=2.228 1%=3.169
Catla	-0.71	Positively co-related	3.19	
Rui	-0.71	Positively co-related	3.15	
Mrigal	-0.66	Positively co-related	2.76	
Carpio	-0.69	Positively co-related	3.01	

Table No. 306

Simple Correlation (r) between P^H and average growth of different fish species of the pond-6 during April'99-March, 2000.

Species	Correlation (r)	Remark	t	t-value from the table
Silver	-0.52	Positively co-related	1.92	5%=2.228 1%=3.169
Catla	-0.55	Positively co-related	2.09	
Rui	-0.56	Positively co-related	2.16	
Mrigal	-0.53	Positively co-related	1.99	
Carpio	-0.55	Positively co-related	2.07	

Table No. 307

Simple Correlation (r) between Dissolved oxygen and average growth of different fish species of the pond-6 during April'99-March, 2000.

Species	Correlation (r)	Remark	t	t-value from the table
Silver	-0.45	Positively co-related	1.58	5%=2.228 1%=3.169
Catla	-0.49	Positively co-related	1.80	
Rui	-0.45	Positively co-related	1.61	
Mrigal	-0.48	Positively co-related	1.75	
Carpio	-0.51	Positively co-related	1.86	

Table No. 308

Simple Correlation (r) between Phytoplankton and average growth of different fish species of the pond-6 during April'99-March, 2000.

Species	Correlation (r)	Remark	t	t-value from the table
Silver	-0.32	Positively co-related	1.06	5%=2.228 1%=3.169
Catla	-0.33	Positively co-related	1.11	
Rui	-0.30	Positively co-related	0.98	
Mrigal	-0.31	Positively co-related	1.01	
Carpio	-0.32	Positively co-related	1.07	

Table No. 309

Simple Correlation (r) between Zooplankton and average growth of different fish species of the pond-6 during April'99-March, 2000.

Species	Correlation (r)	Remark	t	t-value from the table
Silver	-0.37	Positively co-related	1.27	5%=2.228 1%=3.169
Catla	-0.35	Positively co-related	1.17	
Rui	-0.36	Positively co-related	1.21	
Mrigal	-0.34	Positively co-related	1.15	
Carpio	-0.33	Positively co-related	1.10	

Table-310
Showing value (r) between different Bio-chemical factors of feed sample-3, at liquid basis.

Between		Coefficient of correlation (r)
Moisture	Protein	0.99
Moisture	Crude Fibre	1
Moisture	Fat	1
Moisture	Carbohydrate	1
Moisture	Ash	1

Table No-311

Specific growth rate of different species of fish is in different ponds during April'98-March'99.

Species	Specific Growth Rate in %						
	Pond-1	Pond-2	Pond-3	Pond-4	Pond-5	Pond-6	Pond-7
Silver	1.46	1.41	1.43	1.40	1.59	1.63	1.37
Catla	1.22	1.17	1.35	1.27	1.35	1.40	1.24
Rui	1.17	1.18	1.17	1.20	1.27	1.33	1.11
Mrigal	1.24	1.21	1.28	1.25	1.24	1.27	1.21
Carpio	1.42	1.46	1.45	1.38	1.46	1.47	1.29

Cost Benefit Analysis

Table: 312

Expenditure	Rate	Pond-1		Pond-2		Pond-3		Pond-4		Pond-5		Pond-6		Pond-7	
Item	Tk/kg	Quantity (kg)	Total Amount	Quantity (kg)	Total Amount	Quantity (kg)	Total Amount	Quantity (kg)	Total Amount	Quantity (kg)	Total Amount	Quantity (kg)	Total Amount	Quantity (kg)	Total Amount
A. Input	a.Lime	102 @ 3.50/=	357/=	105 @ 3.50/=	367.50/=	108 @ 3.50/=	378/=	114 @ 3.50/=	399/=	114 @ 3.50/=	399/=	111 @ 3.50/=	380/=	102 @ 3.50/=	357/=
	b.Slurry	16387kg @ 0.25/=	4096.75/=	13933kg @ 0.25/=	3483.25/=	8628kg @ 0.25/=	2157.00/=	8410.8kg @ 0.25/=	2102.70/=	10556.7kg @ 0.25/=	2639.17/=	10770.90kg @ 0.25/=	2692.72/=		
	c.Master oil cake					5752kg @ 8.50/=	48892/=	5607kg @ 8.50/=	47659.50/=	4524kg @ 8.50/=	38454/=	4616kg @ 8.50/=	39236.00/=	6000kg @ 10.50/=	63000/=
Sub. Total		4453.75/=		3850.75/=		51427/=		50161.20/=		41492.17/=		42308.72/=		63357/=	
B. Stocking		Unit price	Tk.	Unit price	Tk.	Unit price	Tk.	Unit price	Tk.	Unit price	Tk.	Unit price	Tk.	Unit price	Tk.
1. Silver 2. Rui 3. Catla 4. Mrigal 5. Carpio		5500 pc @ 0.20/=	1100/=	5600 pc @ 0.20/=	1120/=	5800 pc @ 0.20/=	1160/=	6120 pc @ 0.20/=	1224/=	6000 pc @ 0.20/=	1200/=	6000 pc @ 0.20/=	1200/=	5200 pc @ 0.20/=	1040/=
Sub. Total		1100/=		1120/=		1160/=		1224/=		1200/=		1200/=		1040/=	
C. Miscellaneous		7000/=		7000/=		7000/=		7000/=		7000/=		7000/=		7000/=	
Grand Total		12553.75/=		11970.75/=		59587/=		58385.20/=		49392/=		50508.72/=		71397/=	
Income		561.00kg @ 40/=	22440/=	560.35kg @ 40/=	22414/=	1851.48kg @ 40/=	74059.20/=	1947.88kg @ 40/=	77915.20/=	2292.54kg @ 40/=	91701.60/=	2150.81kg @ 40/=	86032.40/=	2281.40kg @ 40/=	91256/=
Net Profit		9886.25/=		10443.25/=		14472.20/=		19530/=		42408.60/=		35523.68/=		19859/=	
Profit/ha		29077.20/=		29837.85/=		40200.55/=		51394.73/=		111601.57/=		96009.94/=		58408.82/=	