SUMMARY
The thesis gives a comprehensive account of zooplankton covering:

(a) Seasonal dynamics in man made fish ponds
(b) Diel dynamics in man made freshwater tank and fish ponds
(c) Mass production of a few zooplankters and
(d) Utilization of zooplankton as food of carps and *Tilapia*.

These studies were carried out between January 1989 through June 1993.

(1) Four fish ponds located in the Yamalur village, and the Madiwala tank, Bangalore South taluk were selected for the studies on zooplankton dynamics. The fish ponds are used for stocking fry and fingerlings of carps, while the Madiwala tank harbours a fairly good composition of crustaceans and fishes.

(2) Weekly samples of water and monthly samples of bottom sediments were collected from the four ponds and analysed for the variations in a few physico-chemical parameters. The patterns of zooplankton abundance, species composition and production were also studied.

(3) In all the ponds, air temperature significantly influenced the thermal pattern of surface water. During the study period, while the air temperature fluctuated between 24-35°C, that of water ranged from 22 to 34.8°C. Since the depth of water column in these ponds was low (1.25 m) no thermal stratification was observed.
(4) Temporal variations in Secchi disc transparency, turbidity and conductivity of water in the four ponds were evident. Secchi disc transparency and turbidity of water exhibited an inverse relationship. High values of conductivity observed in April are a resultant of low rainfall, long photoperiod and intense sun shine hours. In all the ponds, the water remained alkaline.

(5) Dissolved oxygen in the four ponds was not a limiting factor and it always remained higher than 4.5 mg l\(^{-1}\). The phosphate-phosphorus level remained low and the concentration of this nutrients varied in the four fish ponds.

(6) The sediment pH remained basic and the specific conductance as compared to the man made tanks in Bangalore, although remained low, fluctuated considerably. The nutrients of the sediment exhibited correlative fluctuations with those of water.

(7) The most dominant groups of zooplankton were in the order Copepoda-Rotifera-Cladocera. While *Mesocyclops leuckarti* was the most dominant copepod, among rotifers 8 species were recorded in these ponds. *Diaphanosoma* sp, *Daphnia* sp. and *Scapholeberis kingi* were the cladocerans found in these ponds.

(8) Diel variations in the physico-chemical features of surface water were evident in the Madiwala tank. Although the pattern of diel variations in air and water temperatures during June, September, December and March remained more or less similar, the magnitude of variations differed.
(9) Lowest oxygen levels were recorded during the dark phase of 24 hr cycle. Clear diel pattern in the concentration of the nutrients calcium and phosphorus was not observed. However there were variations between the 4 months.

(10) In all the four fish ponds, zooplankton exhibited diel variations in their peak occurrence. However, the time of occurrence of the peak during the 4 months did not coincide. In all, 30 species of zooplankters belonging to protozoa, rotifera, cladocera and copepoda were recorded in the Madiwala tank. Rotifers contributed nearly 47-57% to the total zooplankton density.

(11) In all the fish ponds, copepods displayed a clear diel pattern but the maximum occurrence did not coincide.

(12) Mass production of Scapholeberis kingi, Brachionus calyciflorus, B. angularis, Monostyla sp. and Mesocyclops leuckarti were carried out using several combinations of rice bran, cow dung, groundnut oil cake, superphosphate (P₂O₅), poultry manure and Baker's yeast.

(13) When these fertilizers were used in different combinations, a maximum production rate of 4125 l⁻¹ of S. kingi individuals were obtained and generally the peak was found to occur between 21st and 26th day.

(14) Baker's yeast appears to markedly increase the production rate of rotifers. In a fertilizer combination of GOC+CD+Baker's yeast, Brachionus angularis displayed a production rate of 78,670 l⁻¹. Irrespective of the nature of fertilizer used,
the peak production of *B. calyciflorus* or *B. angularis* was found to occur between 20th and 28th days. In general a peak production is always followed by a sharp decline in the density of rotifer.

(15) The production rate of the copepod *Mesocyclops leuckarti* was found to depend on the nature of fertilizer used. The presence of Baker’s yeast in the culture medium (0.0007 g/l day\(^{-1}\)) yielded the highest production (10,143 l\(^{-1}\)) of *M. leuckarti*.

(16) In a mixed culture of *M. leuckarti* and *Monostyla* sp. the production rate of copepod decreased (2600 l\(^{-1}\)) while that of *Monostyla* sp. was delayed. It is also evident that occurrence of a peak in the production of *M. leuckarti* appears to shift to 31st day in the presence of a rotifer while in its absence it is found to occur between 23rd-28th days.

(17) For the advance of aquaculture, studies on physiological energetics in conjunction with manipulation of diets are of prime importance. The results of studies on physiological energetics throws light on the usefulness of zooplankton for the survival, growth and conversion efficiency of carps and cichlid fishes.

(18) An exclusive food of nauplius and adult stages of *Mesocyclops leuckarti* does not support the survival of *Catla catla* fry. Instead they were found to attack the fry leading to their heavy mortality.

(19) When the fry of hybrid *Labeo fimbriatus* x *Catla catla* were reared exclusively on zooplankton (*Brachionus angularis* and
Mesocyclops leuckarti), although it promoted survival, but resulted in a loss in body weight (negative growth). When zooplankton was supplemented with rice bran, the fry exhibited a positive growth and (6.33 mg/fry day$^{-1}$) and a gross conversion efficiency of 8.59%.

(20) Fry of Cyprinus carpio fed on M. leuckarti and B. angularis displayed a positive growth and a conversion efficiency of 12.1%. As compared to this, individuals reared on rice bran and groundnut oilcake although exhibited higher growth, showed a low conversion efficiency (1.73).

(21) Among all the tested species of carps, Labeo rohita exhibited the highest conversion efficiency (19.23%) when Scapholeberis kingi and M. leuckarti were offered as prey. The daily growth of L. rohita fry was nearly 4.4 times higher than the growth observed in the fry of Oreochromis mossambicus fed on S. kingi and M. leuckarti.

(22) On the whole, the long term studies on zooplankton dynamics in relation to limnology and their production and utilization as fish feed have yielded information on the nutritive value of these zooplankters as fish feed. Further work on the biochemical aspects of these fish food organisms may pave way to understand the causes for their inability to promote the better survival and growth of carps.