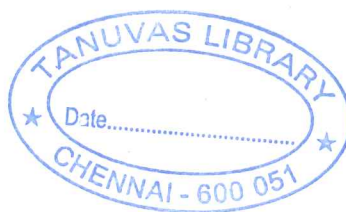


**EFFECT OF ENVIRONMENTAL FACTORS ON THE
DISTRIBUTION AND SEASONAL VARIATION OF
BIOMASS OF PLANKTON IN THE INTEGRATED
FRESHWATER FISH PONDS**

Thesis submitted in part fulfilment of the requirements for the degree of
MASTER OF FISHERIES SCIENCEINFISHERIES ENVIRONMENT
to the Tamilnadu Veterinary and Animal Sciences University, Chennai

ELAKKANAI, P., B.F.Sc.

[ID. No. MFT 09009 (FEN)]



**DEPARTMENT OF FISHERIES ENVIRONMENT
FISHERIES COLLEGE AND RESEARCH INSTITUTE
TAMILNADU VETERINARY AND ANIMAL SCIENCES UNIVERSITY
THOOTHUKUDI-628 008**

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**TAMILNADU VETERINARY AND ANIMAL SCIENCES UNIVERSITY
DEPARTMENT OF FISHERIES BIOLOGY AND CAPTURE FISHERIES
FISHERIES COLLEGE AND RESEARCH INSTITUTE
THOOTHUKUDI-628 008**

CERTIFICATE

This is to certify that the thesis entitled "Effect of environmental factors on the distribution and seasonal variation of biomass of plankton in the integrated freshwater fish ponds," submitted in part fulfilment of the requirements for the degree of Master of Fisheries Science in Fisheries Environment to Tamil Nadu Veterinary and Animal Sciences University, Chennai is a record of bonafide research work carried out by Miss. ELAKKANAI, P., under my guidance and that no part of this thesis has been submitted for the award of any other degree, diploma, fellowship or other similar titles or prizes and that the work has not been published in part or full in any scientific or popular journal or magazine.

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Date : 6-7-2011

A. Srinivasan 6/7/11
(Dr. A.SRINIVASAN)
Chairman
RECOMMENDED

S. Kannappan 24/6/2011

Dr. S. Kannappan, M.Sc., Ph.D.
Senior Scientist (Nutrition, Genetics & Biotechnology Division)
Central Institute of Brackishwater Aquaculture (CIBAICAR)
Ministry of Agriculture 75, Santhome High Road, S.A. Puram
Chennai - 600 078 Tamil Nadu

Date :

EXTERNAL EXAMINER

APPROVED BY:

Chairman : Dr. A.SRINIVASAN
Professor and Head

Members : Dr. P.PADMAVATHY
Assistant professor

Dr. N.FELIX
Associate professor

A. Srinivasan 15/9/11

P. Padmavathy 15/9/11

N. Felix 15/9/11

ABSTRACT

Title : Effect of environmental factors on the distribution and seasonal variation of biomass of plankton in the integrated freshwater fish ponds

Name : Elakkanai, P.

Degree : M.F.Sc. (Fisheries Environment)

Chairman : Dr. A. Srinivasan

Department : Department of Fisheries Environment

College : Fisheries College and Research Institute, Thoothukudi

Year and University : 2011, Tamilnadu Veterinary and Animal Sciences University, Chennai

Plankton are known to play an important role in all aquatic systems as they form basic food source for organisms of higher trophic level. Species composition and the seasonal variations of both phytoplankton and zooplankton biomass in freshwater systems are wholly influenced by physico-chemical conditions of water. Based on this, the present study was carried out to assess the effect of environmental factors on the distribution and seasonal variation of plankton biomass in the integrated fish culture system. For this study, water and plankton samples were collected for water quality and productivity analysis from different fish culture systems such as (i) Pond received goat manure with supplementary feeding (EP1), (ii) Pond received cattle manure without supplementary feeding (EP2), (iii) Pond with supplementary feeding only (EP3) and (iv) Mini-reservoir without supplementary feeding and organic manure (Control-EP4) for a period of seven months in the Fisheries College and Research Institute Campus, Thoothukudi. The ponds EP1, EP2 and EP3 were stocked with fish seeds such as catla, rohu, mrigal, silver carp, grass carp and common carp and the mini reservoir were stocked with above said carp species along with *Pangassius* spp (cat fish).

During the study period, various physico-chemical parameters, biomass, species composition and species diversity index of phytoplankton and zooplankton were recorded with marked seasonal variations in all experimental ponds. The water temperature was between 29 and 33°C, 29.25 and 33°C, 29 and 33.5°C and 30 and

32.5°C in EP1, EP2, EP3 and EP4 respectively. Secchi disc readings recorded in the present investigation ranged from 11.8 to 43.7 cm in all ponds. The water pH showed a range of variation from 7.7 to 8.3 and the dissolved oxygen ranged from 2.5 to 8.4, 2.2 to 4.9, 2.5 to 6.4 and 4.8 to 6.3 in EP1, EP2, EP3 and EP4, respectively. Despite considerable hardness of the water (>192 mg/l) in these ponds, the alkalinity registered at high level in the different experimental systems (16 to 80 mg/l). The mean values of BOD were 3.35, 3.09, 3.12 and 3.61 mg/l in ponds EP1, EP2, EP3 and EP4, respectively. The values of COD were between 6 and 16 in all the experimental systems. All the pond water contained not more than 1.00 mg/l nutrient salts such as nitrite, nitrate, ammonia and phosphate. The monthly value of the chlorophyll 'a' recorded in ponds EP1-EP4 during the study period ranged from 11 to 176, 12 to 93.50, 11 to 127 and 20.64 to 121 mg/m³, respectively. The over all mean value of net production for all the ponds was ranged from 1336.2 to 2498 mgC/m³/day.

Further, the maximum abundance of phytoplankton and zooplankton was noticed in summer months, when compared to winter months in all the experimental ponds. During the study period, a total of 21 species of phytoplankton and 30 species of zooplankton recorded. Of the 21 species of phytoplankton, *Chlorella vulgaris*, *Microcystis aeruginosa* and *Oscillatoria tenuis* were dominant in all the experimental ponds. The range of biomass of phytoplankton recorded in the culture ponds were 1,685-25,50,000 (cells/l), 3,775-13,20,000 (cells/l), 4,075-10,10,000 (cells/l) and 1,400-8,85,000 (cells/l) in EP1, EP2, EP3 and EP4, respectively. The biomass of zooplankton in terms of density was recorded in the range of 34-139, 41-121, 14-114 and 10-119 (nos/l) in EP1, EP2, EP3 and EP4, respectively. Among the zooplankton recorded, the rotifer species such as *Asplanchna* sp, *Brachionus calyciflorus*, crustacean such as copepod nauplii, *Moina micrura* and *Eucypris fuscatus* were dominant.

While the overall Shannon Weiner's diversity index (H) values for the phytoplankton was between 1.0 and 4.2, the diversity index value for the zooplankton was between 1.6 and 3.5. The influence of water quality and plankton productivity on the fish production of the various culture systems was also discussed. The maximum average net fish production (3838 Kg/ha) was observed in EP1, followed by a production of 3574 Kg/ha in EP2. The control pond (EP4) had a minimum of 1457 Kg/ha indicating the advantage of manure input in the carp ponds.