Research Paper
Impact Factor: 4.164
Refereed Journal

IJMDRR
E- ISSN –2395-1885
ISSN -2395-1877

OBSERVATIONS ON THE FOOD PREFERENCE IN GREY MULLETS OF VYPEEN IN COCHIN BACKWATER

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Abstract
The south west coast of India bordering the state of Kerala has extensive backwaters which provide ideal conditions for wide distribution of mullet population. Food and feeding habits of fishes is largely influenced by their habitat. The present investigation is on the food preference shown by grey mullet population inhabiting the brackish water environments of Vypeen Island in Cochin backwater, Kerala. The plankton assemblage of the environment was found to comprise of 14 species making up rich bacillariophycean flora during the post and pre- monsoon months. Plant matter was found to be the major food item in all size categories of fishes analysed. On an average plant matter contributed 75.9% of the stomach contents with considerable seasonal variations. Bacillariophyceae and chlorophyceae were the most preferred food items by the fishes of all size groups analysed. Bacillariophyceae was largely consumed by all size groups of mullets during the pre-monsoon period (53.17%) while chlorophyceae during the post monsoon period (58.05%).

Keywords: Food Preference, Grey Mullet, Vypeen Island.

Introduction

Mullets comprise the most important coastal teleost widely distributed in temperate and tropical waters and having highest potential for artificial rearing in brackish waters. The extensive backwater system of Kerala on the south west coast of India provides ideal conditions for mullets (Gopalakrishnan, 1991; Kurup *et al*., 1995, John, 1995) and projects immense prospects for large scale coastal farming of mullets. The gray mullet *Mugil cephalus* (Linnaeus) is the most popular among mullets that are widely used for brackish water aquaculture in tropical and sub-tropical regions (Pillay *et al*., 1984; Wijeyaratnae and Costa, 1986; 1987; Kurup *et al*., 1995) and are expected to play a major role in the utilization of wetlands for aquaculture. The availability of vast area of coastal water bodies suitable for aquaculture operations project the immense prospects for large scale farming of mullets in India.

Vypeen is the biggest island of the Kerala backwater system which is bounded by Arabian Sea on the western side and the Cochin backwater on the eastern side. The low-lying swamps and tidal creeks of Vypeen support rich mullet population. Fishes differ greatly in the nature of the food they consume. It is generally agreed that fishes are highly adaptable in their feeding habits and utilize the readily available food. Knowledge on the food and feeding habits of fishes is essential to have an idea on the ecology and general growth of the species in the habitat. Estimates of the food preferences are important pre-requisite for aquaculture operations. The increasing demand and scope of grey mullets in coastal farming necessitates evaluation of food preferences shown by the species. The present study is an estimation of the plankton assemblage of the estuarine environment and the food preferences shown by grey mullets inhabiting the Vypeen Island in Cochin backwater of Kerala.

Materials and Methods

200 samples of *Mugil cephalus* were collected from the estuarine environment of Vypeen from cast net catches during a period of 8 months extending between October and May. At each month 25 specimens were subjected to the study of stomach contents. After recording the total length of each specimen the volumetric and numerical methods (Pillay, 1952) were employed for the analysis of stomach contents. The number of each food item in each stomach was recorded and summed up to arrive at the total of each item and the percentage of each item was calculated. The data on total length of examined fishes was categorised in to 4 size groups such as 10-13cm, 13-16 cm, 16-19 cm and 19-22 cm. The monthly estimates of each size category were pooled to arrive at the seasonal estimates for various categories. Since no difference was noticed in the food preference of males and females, the data on both sexes were pooled to arrive at the results

Plankton samples were collected from the sampling area using plankton net of bolting silk during the period and subjected to qualitative and quantitative estimations. For the identification of food organisms and plankton standard literature such as Newell and Newel (1977) and Conway *et al*. (2003) were followed.

Results and Discussion

Fishes consume different kinds of food and they differ greatly in the nature of food they consume. Food and feeding habits of fishes is largely influenced by the habitats in which they occur and their food spectrum varies according to the physico - chemical as well as biological characteristics of the habitats. *Mugil cephalus* is a euryhaline marine teleost that inhabit coastal waters and enters estuaries and rivers where it feeds on all available food including microalgae, filamentous algae,

diatoms and decaying plant detritus associated with sand and mud (Odum, 1970; Brusle, 1981; Saring, 1981; Harridon and Senon1997).

Grey mullets of Vypeen Island were found to ingest considerable quantities of sand and mud together with organic food items and there is difference in organic food items in different seasons. Plant matters were the major component, constituting about 75.9% on an average of the total stomach contents examined (Fig.1). During the post monsoon period the contribution of plant matter varied between 81.5 and 88.4% while their contribution during the pre monsoon period was between 55.1 and 65.7%. Animal matter contributed 14.1% by volume on an average and considerable variations occur in its consumption during different seasons (Fig.2). Grey mullets prefer sand particles rich in organic matter, bacteria, protozoa etc. (Brublet, 1975; Payne, 1976; Wijeyaratnae and Costa, 1990; Rao and Sivani, 1996).Mullets generally feed by grazing on submerged rock and plant surface and the function of inorganic particles in the diet is suggested in the grinding activity to degrade plant cell walls in the pyloric portion of the alimentary canal (Thomson, 1966; Blaber, 1976). Quantitatively sand and mud in the stomach contents of the grey mullets of Vypeen varied between 3.4 and 20.3% by volume with considerable seasonal fluctuations.

The plant components of the diet include green algae, blue green algae, diatoms and dinoflagellates (Table I). The animal matter includes Tintinopsis, Trichodesmium, Copepods and Favella. *Spirogyra* was the predominant plant component (20.3%) followed by *Skeletonema* (19.9%), *Closterium* (11.9%), *Pleurosigma* (7.1%), *Coscinodiscus* (6.9%), *Ceratium* (3.9%) and *Dynophysis* (2.1%). The dominant animal components were Tintinopsis (11.7%) followed by Favella (1.4%). Plant matter is the major food item in all size categories and *Spirogyra, Closterium, Skeletonema, Pleurosigma, Coscinodiscus, Nitzchia, Ceratium, Oscillatoria*, etc were consumed by fishes of all size categories analysed and are found to be the favourable food items of *M.cephalus* of the habitat. The fluctuation in phytoplankton occurrence in fish stomach may be due to the fluctuation of phytoplankton composition and occurrence in the habitat (Turker *et al*, 2003; Marakala *et al*., 2005).

Stomach contents of *M.cephalus* showed little variations among various size categories in both seasons and the importance of different food items in the diet is not constant (Figs. 3 and 4). Bacillariophyceae is largely consumed by all size groups of mullets during the pre monsoon period (53.17%) while during the post monsoon period chlorophyceae forms the predominant component (58.05%). Seasonal difference in the relative importance of a particular food item in the diet does not exactly indicate the change in the abundance of it in the environment because when the importance of certain type of food is low in one size group, it may be higher in another size group. Feeding on certain food item at different intensities may thus be an adaptation to minimize the interspecific competition for food (Wijeyaratnae and Costa,1986, 1990; Blay,1995).During the post monsoon season *Spirogyra* formed the predominant component of food item in all size categories(29.2-55.3%) followed by *Skeletonema* (10.4 -19%) and *Closterium*(6.6 -24.7%).While during the premonsoon season *Skeletonema* was the predominant component (13.1 -26.8%) followed by *Coscinodiscus* (10.4- 17.95%). Animal components formed a major item of the food (15.8 -22.9 %) during the pre monsoon period with *Tintinopsis* as the major one (7.14- 20.36%).

In estuarine ecosystems the plankton productivity gives information relating to the amount of energy available to support the bioactivity of the system. The primary production indicates organic production at the base of a conceptual food chain. Phytoplankton productivity is a major source of primary food energy for most of the ecosystem. *Coscinodiscus* was the predominant phytoplankton during both the post (24.4%) and pre monsoon (26.6%) seasons in the habitat. *Skeletonema, Pleurosigma, Chlorella* and *Biddulphia* were also contributed considerably to the phytoplankton population of the habitat. A much greater abundance of diatoms and other phytoplankton in the favourable environmental conditions during the post monsoon period (Table II) resulted in a dense zooplankton production and its consumption by the fishes of all size categories. Seasonal variation of plankton density is found to be influenced by the feeding intensity of fishes (Turker *et al*., 2003) and the fluctuations in composition and occurrence of plankton in the water may be due to difference in food preference by the fishes.

It is a well-known biological and ecological fact that the food of an animal may be directly associated with its feeding habits and habitats. The animals exhibit such an ability to adapt themselves to life in so many different types of habitats. A wider flexibility in feeding to ensure a constant energy supply for the subsistence of the population has been reported for mugilids (Brusle, 1981) and it appears in the present study that although the individuals of different size groups feeds on the same type of food, the competition for food is minimized by feeding on each type of food at different rates. *Mugil cephalus* is found to be an omnivore showing preference to plant matter, however, there exists flexibility in food preference which ensures a constant energy supply for the sustenance of the mullet population inhabiting the brackish water environments of Vypeen Island.

References

1. Blaber, S.J.M.1976 The food and feeding ecology of mugilidae in the St.Lucia lake system. Biol. J.Linn.Soc., 9:267-277.
2. Blay, J.Jr. 1995 Food and feeding habits of four species of juvenile mullets (Mugilidae) in a tidal lagoon in Ghana.J.Fish.Biol. 46: 134-141.
3. Brublet, J. 1975 Observations on the biology of Mugil cephalus : Possibility of its culture on the Mauritanian coast. Aquaculture, 5: 271-281.
4. Brusle, J. 1981 Food and feeding in grey mullets. In: Aquaculture of the grey mullets (O.H.Oren, Ed.)Cambridge University press, pp185-217.
5. Conway, D.V.P., R.G, White, J, Hugues-Dit-Ciles, C.P. Gallienne and D.B.Robbins 2003 Guide to the coastal and surface zooplankton of the south western Indian Ocean. Occasional publication, Mar.Biol.Ass.U.K. (15), 345pp.
6. Gopalakrishnan, A. 1991 Studies on some aspects of reproductive physiology of the female greay mullet. PhD Thesis, Central Marine Fisheries Research Institute, Cochin.228pp.
7. Harridon, I.J.H. and H. Senon 1997 Mugilidae mullets In: K.E.Carpenter and V.Niem (Eds) FAO identification guide for fishery purposes, The western central Pacefic references, No: 9812, pp: 41-42.
8. John, M.C.1995 The grey mullets of Kayamkulam lake, India and their fishery. Copeia, 3: 225-330.
9. Kurup, B.M., M.J.Sebastian, T.M.Sankaran and P.Rabindranath 1995 Exploited fishery resources of the Vembanad Lake: Estimates of marketable surplus production. J.Mar.Biol.Ass.India, 37(1&2):1-10.
10. Marakala,C. K.M.Rajesh, M.Ganapathinaik and RR.M.Mrudula, Ecology and biodiversity of macrofauna in a fringed lagoon, south west coast of India. IndianJ.Fish. 52(3): 293-299.
11. Newell,G.E. and R.C.Newel 1977 Marine plankton- Apractical guide. Hutchinson Educational Ltd, London.244pp
12. Odum,W.E. 1970 utilization of the direct grazing plant and detritus food chains by the stripped mullet, Mugil cephalus. In:Marine food chain(J.H.Steel,Ed.) pp220-240.
13. Payne,A.L. 1976 The relative abundance and feeding habits of grey mullet species occurring in an estuary in Sierra Leone,West Africa. Mar.Biol. 35: 277-286.
14. Pillai,S.M., P.K.Ghosh,T.Rajalakshmi and A.K.Roy 1984 Observation in growth,survival and production of grey mullet, Mugil cephalus(L), Liza parcia(Hamilton) and Liza tade(Forsska) in a coastal low-saline polyculture pond. Proc.Symp.CoastalAquaculture.pp776-781.
15. Pillay, T.V.R., 1952 A critiques of the methods of study of food of fishes. J.Zool. Soc.India, 4(2): 185-200.
16. Rao,L.M. and G.Sivani 1996 The food preference of five commercially important fishes of Gostani estuary. IndianJ.Fish. 43(2):199-202.
17. Saring, S. 1981 The mugilidae in polyculture in freshand brackish water fish ponds. In: Aquaculture of the grey mullets(O.H.Oren,Ed.)Cambridge University press, pp 391-409.
18. Thomson, J.M.1966. The grey mullets. Mar.Biol.Oceanogr. 4:301-305.
19. Turker,H., A.G.Eversole and D. E. Bume 2003 Effect of Nile tilapia, Oreochromis niloticus(L) size on phytoplankton filtration rate. Aqua. Res. 34:1087-1091.
20. Wijeyaratnae,M.J.S. and H.H. Costa,1986 On the biology of an estuarine population of Grey mullet, Mugil cephalus L. in Negombo Lagoon,SriLanka. Cybium, 10(4): 351-363.
21. Wijeyaratnae,M.J.S. and H.H. Costa,1987 The biology of grey mullets in a tropical lagoonin Srilanka I- Age and growth. Mahasagar. 20(3): 160-170.
22. Wijeyaratnae,M.J.S. and H.H. Costa,1990 Food and feeding of two species of Grey mullets Valamugil buchanai(Bleeker) and Liza vaigiensis inhabiting back water rnvironments in Srilanka. IndianJ.Fish.37 (3): 211-219.

Table I: Percentage composition of food items (range) in M. cephalus of Vypeen during the post and pre monsoon periods

Food item	Post monsoon	Premonsoon
Plant Component	72.1-93.8	55.1-75.7
Chlorophyceae	38.2-62.4	13.6-22.8
Bacillariophyceae	28.4-43.3	53.8-68.7
Cyanophyceae	2.3-12.6	4.4-16.2
Dinophyceae	1.8-5.1	0.8-2.1
Animal Component	1.8-12.5	15.8-22.9
Sediment component	0-9.1	1.2-21.2

Table II: Occurrence and percentage distribution (range) of plankton in the brackish waters of Vypeen during the post and pre monsoon periods

Plankton Group	Season	
	Post Monsoon	Pre Monsoon
Chlorophyceae	11.8- 34.4	10.8-21.4
Bacillariophyceae	33.6- 65.5	44.6- 73.8
Cyanophyceae	1.9- 5.2	0.9- 3.1
Dinophyceae	0.5-1.7	1.5-3.8
Zooplankton	1.6- 10.7	5.1- 19.6

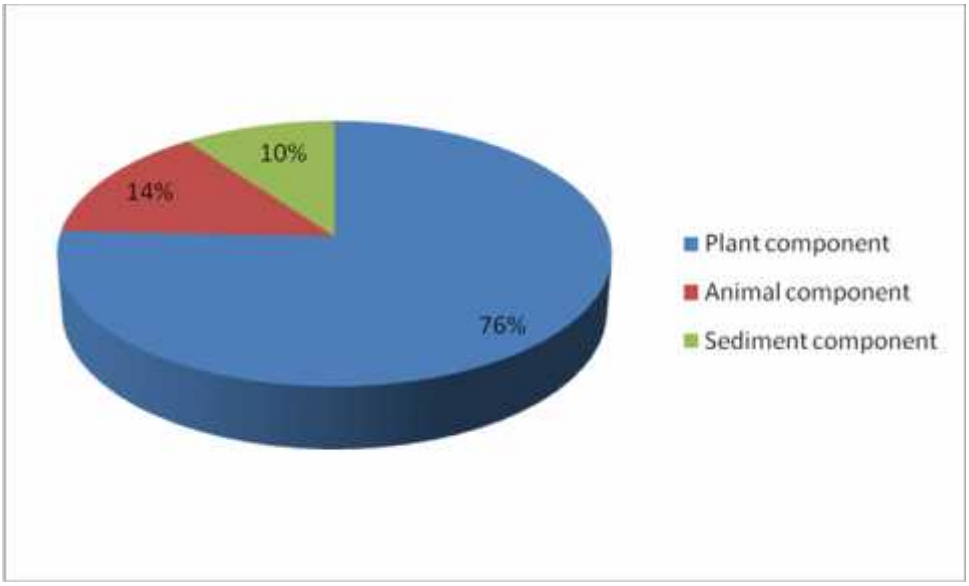

Fig.1 Composition (%) of food items in the stomach of the grey mullets of Vypeen

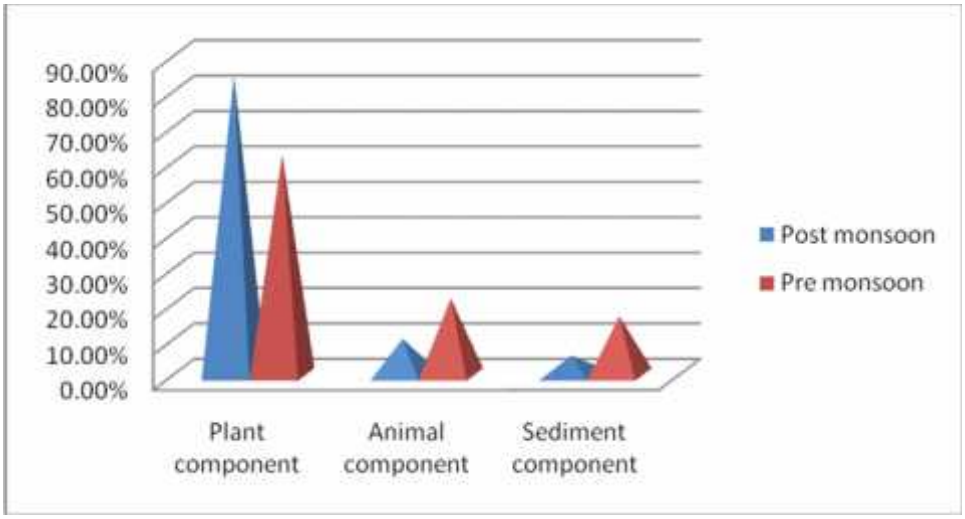

Fig.2. Seasonal variations in the components of stomach contents (% volume)

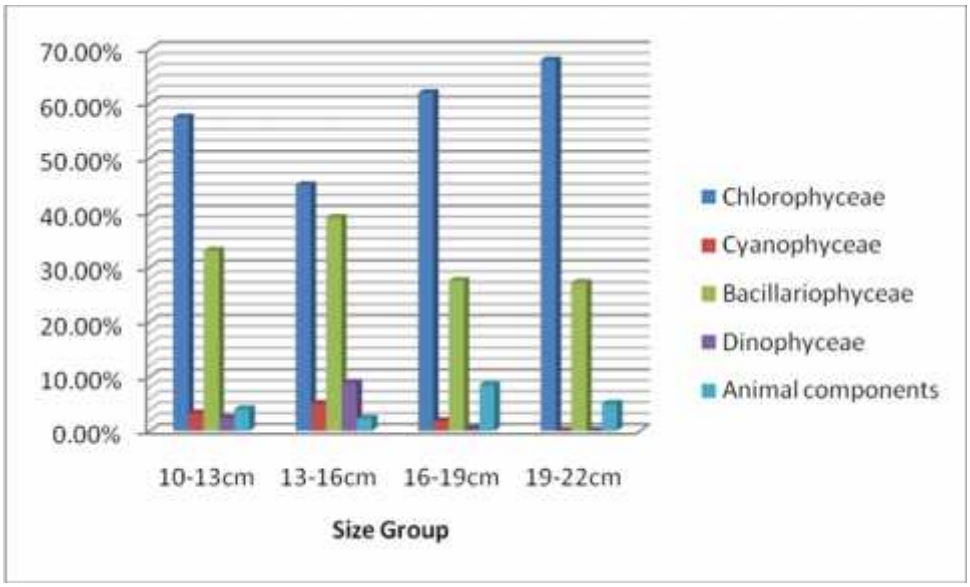

Fig.3 Percentage composition of food items in the gut contents of various size categories of *Mugil cephalus* during the post monsoon (Oct-Jan) period

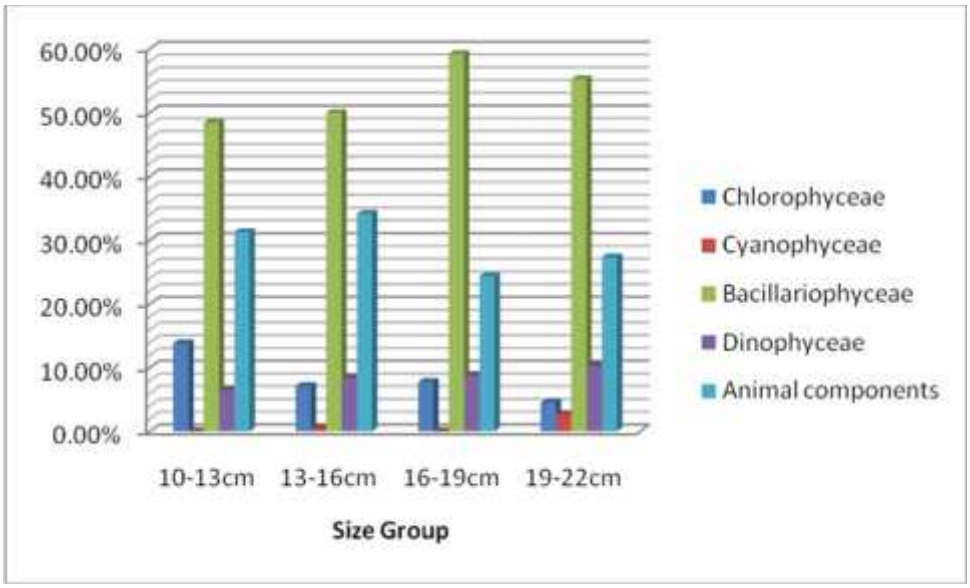

Fig.4 Percentage composition of food items in the gut contents of various size categories of *Mugil cephalus* during the pre monsoon (Feb-Mar) period