ANALYSIS OF STOMACH CONTENTS IN GREEN BACK MULLET, *CHELON SUBVIRIDIS* FROM MERBOK ESTUARY, MALAYSIA

Kaniz Fatema*, Wan Maznah Wan Omar[1] and Mansor Mat Isa[1]

Department of Fisheries, University of Dhaka, Dhaka-1000, Bangladesh

Greenback Mullet, *Chelon subviridis (*Valenciennes, 1836) is a member of the family Mugilidae occurring in the fresh, brackish and coastal marine waters of the tropical and subtropical regions. This family recognized due to its highly specialized adaptation of feeding on surface sediments associated with organic components (Odum 1970). Stomach contents analysis of animals are the corner stones for explaining the nutritional requirements and their interactions with other organisms (Windell and Bowen 1978). Research publication on feeding habit of this mullet was in Malaysia especially on Merbok is very scarce.

In the present study, fish samples were collected from the upstream of Lalang and Sameling River from January to December 2011 on monthly interval. The samples were collected from artisanal fishermen who operate the barrier nets, with the dimensions of the net at 100 – 120 m long, 3 – 5 m deep, and with 2.5 cm mesh size and without bunt. Fishing operations were carried out 3-4 days before and after the full moon and new moon associated with spring tides of the month. Fishing activities were normally halted during neap tides. During the low tide nets were set by anchoring the bottom rope to the river bed. Then the head rope was raised and secured to poles during the high water. Finally, the fish was harvested during the low-water period for about 12 h after the net was set. Before transporting the fish samples to the laboratory for further analysis, they were preserved in labeled polyethylene bags with 10% formalin to prevent digestion of food materials and to stop the enzymatic activity of the stomach contents.

The stomach contents were analyzed following two methods:

(i) *Numerical method*: In numerical method, at first the number of individuals in each food category was recorded for all stomachs. Then, the total was expressed as a proportion, usually a percentage, of the total individuals in all food categories (Ikusemiju and Olaniyan 1977).

The mean number of individuals per stomach in each food category was calculated.

* Author for correspondence: *Department of Fisheries, University of Dhaka, Dhaka-1000, Bangladesh* <f.kaniz@yahoo.com>. **[1]**School of Biological Sciences, Center for Marine and Coastal Studies (CEMACS), Universiti Sains Malaysia, 11800 Penang, Malaysia.

(ii) *Frequency of occurrence method***:** Frequency of occurrence method is a way of recording data gleaned from stomach contents for calculating the number of stomachs containing one or more individuals of each food category. This number was then expressed as a percentage of all stomachs or all those containing food. Frequency of occurrence was calculated according to the formula by Hyslop (1980) and Bowen (1983): *Fi*= (*ni*/*n*)* 100, Where, *Fi*: frequency of occurrence of the *i* food item in the sample, *ni*: number of stomachs in which the *i* item is found, *n*: total number of stomachs with food in the sample.

Stomach food contents of *C. subviridis* are showed in Table 1. Eight major groups were identified and these were diatoms, cyanobacteria, desmids, plant materials, zooplankton, detritus, sand grains and pisces. In *C. subviridis*, plant materials constitute the most important food item by numerical method (65.32%), while diatom (*Nitzschia* sp., *Navicula* sp., *Chaetoceros* sp., *Coscinodiscus* sp., *Epithemia* sp., *Gyrosigma* sp., *Cyclotella* sp., *Pleurosigma* sp., *Fragillaria* sp., *Meridion* sp., *Melosira* sp., *Surirella* sp., *Pinnularia* sp., *Cymbella* sp. and unidentified) formed the most frequently consumed food item by the occurrence method (37.89%), respectively.

Table 1. The stomach contents of *Chelon subviridis* (n = 225) from the Merbok estuary Malaysia

	Numerical method		Occurrence method	
Food Items	No. of individual	%	No. of individual	%
Diatoms				
Nitzschia sp.	324		133	
Navicula sp.	281		113	
Chaetoceros sp.	366		120	
Coscinodiscus sp.	14		11	
Epithemia sp.	12		12	
Gyrosigma sp.	416		125	
Cyclotella sp.	1244		188	
Pleurosigma sp.	114		40	
Fragillaria sp.	15		14	
Meridion sp.	1		1	
Melosira sp.	13		6	
Surirella sp.	4		3	
Pinnularia sp.	10		5	
Cymbella sp.	1		1	
Unidentified	127		24	

Total	2942	22.67	796	37.89
Cyanobacteria				
Oscillatoria sp.	553		115	
Spirogyra sp.	36		27	
Spirulina sp.	261		67	
Anabaenopsis sp.	33		17	
Scenedesmus sp.	1		1	
Unidentified	26		17	
Total	910	6.88	244	11.61
Desmids				
Closterium sp.	18		11	
Penium sp.	17		16	
Total	35	0.265	27	1.29
Plant materials	8643	65.32	209	9.95
Total	8643	65.32	209	9.95
Zooplankton				
Polycheates	226		107	
Molluscs	67		52	
Nematods	64		58	
Rotifer	21		18	
Oikopleura	4		4	
Daphnia sp.	2		2	
Copepod	81		70	
Copepod appendages	181		118	
Argulus sp.	9		9	
Coelenterates	3		3	
Larva	31		19	
Total	689	5.21	460	21.89
Detritus	-	-	209	9.95
Total	-	-	209	9.95
Sand grains			147	7
Total	-	-	147	7
Pisces (bones, scales)	12	0.091	9	0.428
Total	12	0.091	9	0.428

Zooplankton made up 5.21 % and 21.89% of the stomach content measured by numerical and occurrence methods, respectively, while pisces (bones, scales) constitute 0.091 and 0.428% by numerical and occurrence methods, respectively (Table1). The least consumed food item was the pisces and desmids in the stomach of fish species. Detritus was the most eaten item and was prominent by occurrence method. Detritus constitute 9.95 % and sand grains consist of 7.00 %by occurrence method in this fish species (Table 1). Plant materials were important constituents, after the diatom and zooplankton by both the numerical and occurrence methods. By numerical method, plant materials were the most abundant food item in the Merbok estuary during the study period. Other food items of importance consumed by *Chelon* fish species included the diatoms, which was more abundant than the cyanobacteria, as shown by numerical and occurrence methods.

Stomach content analysis using both frequency of occurrence and numerical method of *Chelon subviridis* identified plant materials, diatoms and detritus as predominant food items in most months during the study period. However, in numerical method detritus and sand grains could not be counted. Therefore, frequency of occurrence method is useful for qualitative analysis of stomach content whereas numerical method is mostly preferred for quantitative assessment.

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