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Fish Biology

FOOD AND FEEDING HABIT OF *BARBUS BELAYEWI* (MENON) FROM DIYALA RIVER, BAGHDAD, IRAQ

POKARM I ODŻYWIANIE SIĘ *BARBUS BELAYEWI* (MENON) Z RZEKI DIYALA W IRAKU (BAGDAD)

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Gut contents of 217 specimens of *B. belayewi* were studied. The specimens were collected from Diyala river between September, 1982 and June, 1983. The fish fed moderately during most of the time under investigation. Heavy feeding occured only in Sep. and Dec. 1982. They were poorly fed only in June, 1983. Organic debris and detritus formed the major bulk of the diet followed by planktonic algae and aquatic plant parts. Zooplankton, parts of aquatic insects and nematodes also occurred occassionaly but did not contributions significantly.

INTRODUCTION

Barbus belayewi is found only in Tigris river and its tributeries (Khalaf, 1984). The species was recorded by Menon, (1956) from Tigris river at Baghdad, Iraq. It is a commercially important food fish in Iraq although no farming of the fish has yet been reported. Latif et al (1983) studied the heavy metals content in the tissues of the fish, Khalaf et al (1985) studied the age and growth of the fish. All other previous works on the

fish are only taxonomic. Food intake and feeding habits are fundamental life processes. A proper understanding of the food and feeding habits of the fish is therefore essential for the successful management of a fishery. To the best of the knowledge of the authors, no study has yet been on the feeding habits of the fish. The present work, therefore was undertaken to establish the feeding habits as well as the qualitative and quantitative composition of the food of *B. belayewi* in Diyala river at, Rustamiyah, Bagdad, Iraq.

DESCRIPTION OF THE STUDY AREA

Diyala river is a tributary of Tigris river. The water of the river at Rustaimyah about 20 Km. to the south-east of Baghdad receive partially treated domestic sewage, untreated domestic waste through the polluted army canal (Mohamed, 1980), and industrial waste (Latif et al, 1983) including heavy metals (Mousa, et al, 1983). Some water quality data of the river Diyala at Rustamiyah along with proposed water quality content standard for Iraqi rivers (Directorate General of Human environmental, Republic of Iraq, 1967) are presented in Table (1) to show the degree of pollution.

Table 1

Some Chemical properties of Diyala river at Rustumiyah

	Maximum (mg/L)	Minimum (mg/L)	Water quality Content standard for Iraqi rivers (mg/L)
Biochemical oxygen demand (BOD_5).	225	30	Less than 3
Total Hardness ($CaCO_3$)	600	300	——
„ Suspended Solid.	400	100	——
„ dissolved solid.	900	300	——
„ Sulfate (SO_4)	350	85	200
„ Phenol.	0.12	0.01	0.005
„ Copper.	0.56	0.01	0.05
„ Nickel.	1.70	0.05	0.1
„ Cadmium.	0.33	Trace	0.005
„ Lead.	0.67	0.19	0.05
„ Zinc.	0.27	0.02	0.05

Based on Mousa at al. (1983).

MATERIAL AND METHOD

Fish were collected using gill nets (20 mm to 40 mm). As gill nets were used in the collection, the specimens were taken out from the net immediately after capture. The specimens were collected at monthly intervals between September 1982 and June 1983, except for in march 1983. A total of 217 fish was collected during the period of investigation. All the specimens were orally injected with 10% formalin immediately after capture in order to stop digestive activity. The specimens were finally preserved in 10% Formalin and carried out to the laboratory for the subsequent analysis. Fork length and wet weight of all the specimens were recorded to the nearest millimetre and gram respectively. The gut of each fish was removed, wet weight of its contents was recorded (g), transferred to labelled vials and preserved in 4% formalin for subsequent analysis. The amount of food eaten by the fish were assessed by the following methods:

1 – Relative weight of the gut contents: The relative wet of of the gut contents were calculated as:

$$\frac{\text{Wet weight of the gut contents}}{\text{Wet weight of the fish}} \times 100$$

2 – Degree of fullness: The degree of fullness of the guts were determined by visual observation under the following categories:

Empty, $\frac{1}{4}$ full, $\frac{1}{2}$ full, $\frac{3}{4}$ full, and full.

3 – Feeding index: Monthly feeding index of the fish were calculated by the following formula:

$$\frac{\text{Number of the fish with guts } \frac{3}{4} \text{ full and above}}{\text{Total number of fish caught in a month}} \times 100$$

Composition of the food items were evaluated by the points methods of Hynes (1950) and frequency of occurrance method. Food items were placed into seven major groups as follows: organic debris, detritus, planktonic algae, aquatic plant parts, zooplanktonic parts, parts of aguatic insects and nematodes. Percentage composition of food items were worked out according to the different groups of food assessed both by points method and frequency of occurrance method.

RESULTS AND DISCUSSION

Monthly average data on sample size, mean fork length, mean weight, relative weight of the gut contents and feeding index of *B. belayewi* are presented in Table 2. The fish were of uniform size because the collection were made using gill nets. The maximum

Table 2

Mean Fork Length, mean Weight, relative weight of gut contents and feeding index of *Barbus belayewi* in different months

Months	No. of fish.	Mean fork length (MM)	Mean weight (g)	Relative weight of gut contents	Feeding index
September	30	212.2 ±23.64	150.2 ±53.49	7.37 ±3.31	7.33
October	30	243.5 ±37.9	265.2 ±135.7	9.03 ±2.3	86.67
November	30	234.3 ±50.1	201.3 ±105.94	6.94 ±1.7	53.33
December	30	268.0 ±28.8	321.8 ±104.0	9.80 ±1.55	93.33
January	17	261.7 ±19.9	306.3 ±74.8	7.10 ±2.22	58.80
February	20	263.9 ±25.0	332.9 ±86.11	8.24 ±1.9	70.00
April	20	290.2 ±70.78	363.7 ±93.57	6.10 ±1.55	45.00
May	20	272.6 ±26.69	370.3 ±98.08	7.01 ±1.8	85.00
June	20	256.6 ±23.5	242.2 ±66.9	3.60 ±1.75	20.00

weight of the fish were recorded in April and May, 1983. Which is likely to be due to the maturity of gonads.

Index of fullness: Percentage occurrance of different degree of fullness of the guts in different months during the period of study is presented in figure (1). The fish were considered heavily fed when they were with full guts, moderately fed when they were with 3/4 full and 1/2 full and poorly fed when they were with 1/4 full. Heavy feeding occurred in September and December, 1982. The percentage of poorly fed fish was a maximum in June. Most of the fish were moderately fed during the most of the time under investigation. Howevere, no empty gut was observed during the period of study.

Relative weight of the gut contents: The relative weight of the gut contents varied between 3.6 gm in June, 1983 and 9.8 gm in December, 1982. The weight of the gut contents did not show any particular pattern.

Feeding index: Feeding index varied between 20 in June and 93.33 in December confirming no particular pattern of feeding in different seasons as observed in other methods of evaluation of the amount of food eaten by *B. belayewi* in Diyala river. The maximum amount of food intake in September and December and minimum in June was probably due to the effect of pollution in Diyala river. The pollution activity and its effect is minimum in winter months. As the temperature rises up in Summer, water becomes more polluted due to the rapid decomposition of the sewage discharged in Diyala river at Rustamiyah. Khalaf et al (1984) observed an unusual growth pattern due

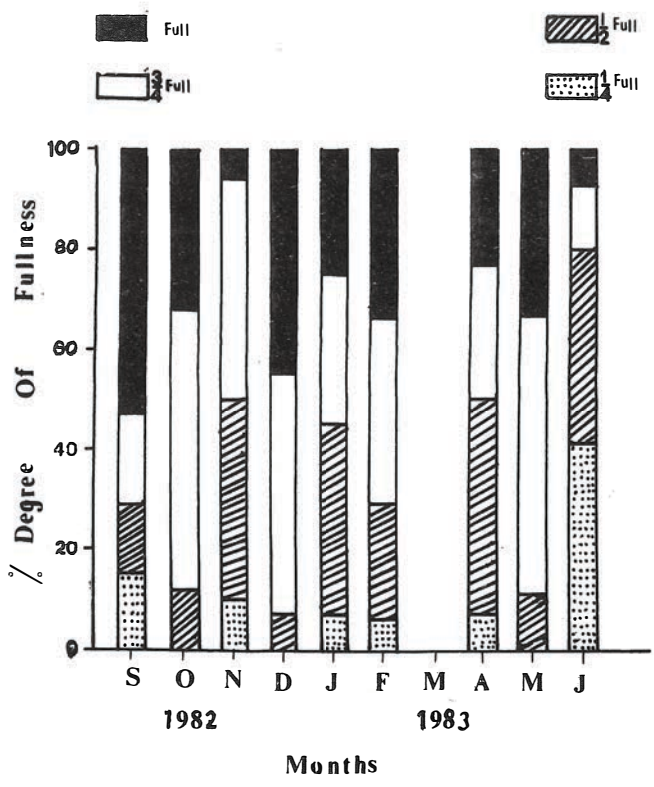

Fig. 1. Percentage occurrence of different degree of fullness of the guts in different months

to the effect of pollution on *B. grypus* collected from the same area. Occassional mass death of fish also occure in summer specially in June and July in Diyala river around Rustamiyah (Latif et al, 1982).

Percentage composition of different food items: Percentage composition of different food items in the diet of *B. belayewi* assessed by both points method and frequency of occurrence method are presented in Table (3). Organic debris, detritus, planktonic algae and aquatic plant parts formed the main bulk of the diet. Organic debris alone formed 41% of the diet and also occured in 100% of the guts of the fish examined. Detritus formed the second important composition of the diet. Detritus contributed 32% of the diet and also occured in 100% of the guts of the fish. Organic debris and detritus did not show any significant variation in the composition of the diet in different seasons. Planktonic algae ranked third in the composition of the diet, contributed about 12% of the diet but occured in almost 100% of the guts. From January to April the contribution of the planktonic algae in the diet of the fish were more than the other months. Aquatic parts ranked 4th in the diet of the fish. The contribution of the aquatic plants were very little except in June, September and October. Zooplankton, parts of aquatic insects and nematodes could not contribute any point in the diet composition of the fish.

Table 3

Percentage composition of different food items of *Barbus belayewi* in different months

Food items		September	October	November	December	January	February	April	May	June
Organic debris	P	40.19	43.81	40.25	48.23	43.19	40.62	39.91	40.91	38.36
	F	100	100	100	100	100	100	100	100	100
Detritus	P	34.64	34.48	40.46	40.54	32.72	34.00	36.87	41.52	39.44
	F	69.55	100	100	100	100	100	100	100	100
Planktonic	P	13.40	14.05	10.84	9.81	22.26	24.38	22.76	12.04	10.78
algae	F	100	100	96.67	100	100	100	100	100	100
Aquatic plant	P	11.77	7.66	1.45	1.42	1.83	1.00	0.46	5.53	11.42
parts	F	89.65	100	20.00	23.30	29.40	15.00	5.00	65.00	70.00
Zooplankton	P	———	———	———	———	———	———	———	———	———
	F	3.45	6.67	———	3.33	———	———	———	5.00	———
Part of aquatic	P	———	———	———	———	———	———	———	———	———
insects	F	3.45	3.33	———	———	———	———	———	5.00	———
Nematodes	P	———	———	———	———	———	———	———	———	———
	F	6.89	13.33	13.33	20.00	5.88	10.00	60.00	45.00	60.00

P = points and F = frequency of occurrence.

Zooplankton just occured in the diet of the fish in September, October and May. Parts of aquatic insects occured only in September, October and May. Although nematodes could not contribute any point in the fish but occurred in all the samples considered during the period of investigation.

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POKARM I ODŻYWIANIE SIĘ *BARBUS BELAYEWI* (MENON) Z RZEKI DIYALA W IRAKU (BAGDAD)

STRESZCZENIE

Zbadano przewody pokarmowe 217 ryb, złowionych wontonami (20–40 mm) w okresie od września 1982 do czerwca 1983. Co miesiąc, z wyjątkiem marca 1983, pobierano próby o liczebności 17–30 osobników. Ryby były uwalniane z wontonów natychmiast po złowieniu, a przewody pokarmowe niezwłocznie konserwowane w 10% rozwtorze formaliny, w celu zatrzymania procesów trawiennych. Określano względną masę zawartości przewodów pokarmowych (w stosunku procentowym do masy ryb) oraz ich wypełnienie w pięciostopniowej skali. Skład pokarmu oznaczano posługując się wskaźnikiem częstości występowania oraz metodą punktową (wg Hynesa, 1950).

Największą liczbę ryb z całkowicie wypełnionymi przewodami pokarmowymi notowano we wrześniu i grudniu, najmniejszą w czerwcu. Osłabienie intensywności żerowania latem może się wiązać ze wzrastającym wraz z temperaturą stopniem zanieczyszczenia wody w rzece. Największy udział w składzie pokarmu miały kolejno: cząstki organiczne (średnio 41%), detrytus (32%) i

fitoplankton (12%). Obecność tych trzech składników dominujących stwierdzono u niemal wszystkich zbadanych ryb. Czwarty składnik, cząstki roślin wodnych, tylko okresowo (wrzesień, październik, czerwiec) osiągał udział około 10%. Zooplankton i fragmenty wodnych owadów występowały sporadycznie.

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Р е з ю м е

Исследовали пищеводы 217 рыб, выловленных гарбой (20-40 мм) с сентября 1982 г. по июнь 1983 г. Ежемесячно, за исключением марта 1983 г., отбирали пробы численностью 17-30 особей. Рыб брали из гарбы сразу после отлова, а пищеводы немедленно консервировали в 10% растворе формалина, для задержки процессов пищеварения. Определяли относительную массу содержимого пищеводов (в процентном отношении к массе рыб), а также их пополнение по 5-ти балльной шкале. Состав пищи определяли при помощи показателя частоты появления, а также точечным методом (по Гинесу, 1950).

Наибольшее количество рыб с полностью заполненными пищеводами отмечали в сентябре и декабре, наименьшее - в июне. Ослабление интенсивности жора летом может быть связано с возрастающей, вместе с температурой, степенью загрязнения воды в реке. Наибольшую часть в составе пищи занимали последовательно: органические частицы (в среднем 41%), детрит (32%), фитопланктон (12%). Присутствие этих 3-х доминирующих составных установлено почти

у всех исследованных рыб. Четвертая составная - - частицы водных растений, только периодически (сентябрь, октябрь, июнь) достигала уровня 10%. Зоопланктон и частицы водных насекомых наблюдались спорадически.

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