

Food and feeding habits of the Bullseye, *Priacanthus hamrur* (Forsskal) off Kerala

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Abstract

Priacanthus hamrur (Forsskal), a column feeder, feeds almost exclusively on crustaceans as revealed by qualitative and quantitative analyses of gut contents. The study conducted on the basis of sex, size and season showed that the food spectrum is limited to eight items. Prawns and prawn tissues formed more than 60% of the total food. Length groups and sex groups have real influence on the feeding nature and preference of food. Feeding intensity was found to vary in two sexes. Increased feeding intensity was noted in mature fishes. Monthly G.S.I. was studied. Feeding rhythm showed no day night specificity

Introduction

Priacanthus hamrur, a perch, belonging to the family Priacanthidae has gained importance as a table fish in recent years. It is very rich in protein (17.8%) and low in lipid (5.1%) (John and Sudarsan, 1988). With the expansion of trawling to deeper fishing grounds the landings of this species have been showing an increasing trend. Considering the large-scale exploitation of this resource and future plan to increase production, it is all the more necessary to have information on various biological aspects of this fish. Knowledge on the food and feeding habits is a prerequisite to answer many practical and scientific questions related to its management and conservation. Some of the earlier works on the feeding habits of

Priacanthids are by Rao (1984) on biology of *P. macracanthus*, Naik (1990) on Priacanthids, Premalatha (1997) on the biology of *P. hamrur* and Philip (1994,1998) on the food and feeding habits of *P. hamrur* from the upper east coast of India. Although attempts were made to study the food and feeding habits of Priacanthids, a detailed study on such aspects from commercial catches of central Kerala is lacking. Hence the results of a systematic study undertaken on the food and feeding habits of *P. hamrur* from central Kerala are presented in this account.

The authors are thankful to Rev. Fr. Jose Chittilappilly CMI, former Principal, Christ College, Irinjalakuda, Kerala for the facilities offered to carry out this work

in the research lab. of the Zoology Dept. of the college. First author is grateful to Shri Xavier Thanippilly, marine exporter, Munambam for providing necessary assistance in the Munambam harbour for collecting specimens.

Material and methods

Study was based on the stomach analysis of 400 fishes sampled from Munambam during January 1997 to December 1998. The fishes were collected from trawl net landings in the morning, noon and night to get a better coverage of the food items of the fish. After recording total length (in cm) and weight (in g), the upper and lower jaws were dissected and separated to study the number and the arrangement of pharyngeal teeth. For studying the food items the stomachs were dissected, weighed, opened and contents analysed by qualitative and quantitative methods. Food items in the stomach were identified to the nearest taxon possible. The sex and stage of maturity of the fishes were also noted. The occurrence of each food item in the diet during different months in the size groups (0-20cm and 20-40cm group) and separately for both sexes were calculated by the occurrence method (Hynes, 1950). Feeding intensity was determined by the degree of distension of stomachs due to food items present. The degree of fullness of stomach was determined on the basis of distension of stomach folds (Rao and Rao, 1991). For evaluating the preference of food consumed, different food items were studied under three categories i.e., active, moderate and poor. Due consider-

ation was given to the size of the food organism as well as its abundance. Feeding index was worked out as described by Kow (1950) i.e.,

$$\text{Feeding Index} = \frac{\text{No of fishes with heavy feeding intensity} \times 100}{\text{Total No. of fish examined}}$$

Feeding rhythm was studied by collecting fishes at 12 hours interval for a period of 24 hours and the condition of the stomach of the fish was estimated. Gastro somatic index was calculated as

$$\text{G.S.I} = \left(\frac{\text{Weight of gut}}{\text{weight of fish}} \right) \times 100$$

Observations and results

The pharyngeal teeth were present in both upper and lower jaws of *P. hamrur*. The upper jaw has two pads i.e., right and left. Each pad has three lobes. Anterior lobe has 20 large teeth bordered by fine sharp teeth. The middle lobe has 28 teeth which were the largest. Posterior lobe showed 14 teeth. In Lower jaw the pharyngeal teeth region is conical in shape. Teeth were present in two longitudinal pads. Each pad had 262 teeth. Pharyngeal teeth help to engulf live organisms while feeding.

Qualitative estimation

Qualitative and quantitative analysis of the food were carried out. Deep sea prawns, prawn tissues, bristles of annelids, invertebrate eggs, animal tissues, fat droplet, pieces and tentacles of *Coelenterates* were the main food items found in the stomach of *P. hamrur*. In addition, the

miscellaneous items constituted occasional items like molluscan shell, alima larvae, mysids, squilla, crabs, fishes, zoea larvae, isopods, copepods, etc. In general the crustaceans (prawn and prawn tissue) were found to be the most favourable food item. The monthly percentage of food items in stomachs are given in Table 1. Prawn tissues identified mainly were of the deep-sea prawns *Solenocera* spp. The stomach content of some fishes contained penaeid prawns such as *Penaeus* spp. and *Metapenaeus* spp.

Quantitative estimation

The results proved that in *P. hamrur* the prawns formed 58.4% of the food items consumed. Annelid bristles (9.9%) formed the second abundant food item followed by animal tissue (6.5%), invertebrate eggs (5.3%), coelenterate tentacles (2.3%), fat droplet (2.1%) and jelly fish (1.6%). In the

females, prawns formed 64.2% while in the males it accounted for 52.6% (Fig. 1). Similarly in 20-40 cm length group the prawns constituted 61.6% compared to 49.3% in 0-20 cm length groups. These observations undoubtedly proved that the length groups and sex groups have a real influence in feeding and preference of food items.

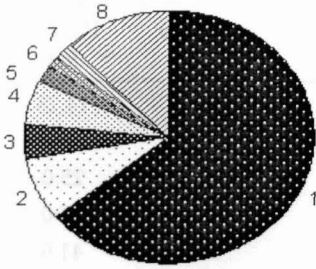
Feeding intensity

Combined feeding intensity in *P. hamrur* was calculated as 76.9% and was found to be varying greatly in two sex groups. It is 71.5% in females and 80.6% in males (Tables 2 and 3). A considerable variation of feeding intensity was also noticed in two length groups of the population. Feeding intensity was very high as 81.7% in 0-20 cm length group, while it was only 75.5% in 20-40 cm length group (Tables 4 and 5). Food items were studied under

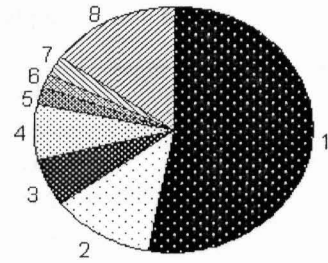
Table 1. Average percentage composition (pooled) of various food items of *P. hamrur* during 1997 and 1998

Month	Prawn tissue	Annelid bristle	Invertebrate egg	Animal tissue	Fat droplet	Coelenterate jelly	Coelenterate Tentacle	Miscellaneous
Jan.	65.6	8.9	4.9	5.1	1.9	1.5	1.5	10.2
Feb.	50.7	10.3	5.7	6.7	2.5	1.9	3.0	18.8
Mar.	49.6	13.1	4.7	9.6	2.7	3.1	2.8	14.0
Apr.	42.9	14.0	6.9	9.7	4.2	1.3	4.2	16.4
May	57.7	8.1	6.6	6.2	1.1	0.8	2.5	16.6
Jun.	55.2	11.2	4.2	5.7	3.3	1.3	2.1	16.6
Jul.	58.8	9.0	6.2	5.5	3.2	1.0	2.5	13.6
Aug.	62.7	5.5	4.5	5.9	0.9	2.3	2.5	15.3
Sep.	61.2	15.2	5.6	6.5	1.6	1.2	0.8	7.5
Oct.	61.2	7.2	5.4	6.1	2.3	3.2	2.3	11.9
Nov.	64.7	9.6	4.1	5.7	1.3	1.5	2.6	10.3
Dec.	70.5	7.2	4.6	5.2	0.7	0.6	1.0	10.0
Av.	58.4	9.9	5.3	6.5	2.1	1.6	2.3	13.4

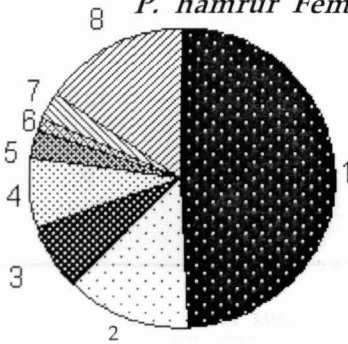
P. hamrur 0 - 20 cm size gr.



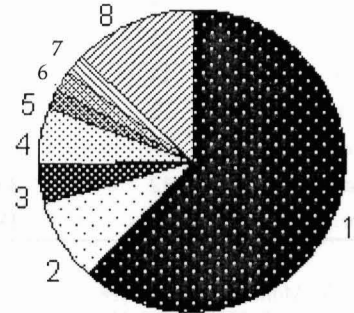
P. hamrur 20 - 40 cm size gr.



P. hamrur Female



P. hamrur male



1-Prawn tissue, 2-Annelid bristle, 3-Invertebrate egg, 4- Animal tissue, 5-Fat droplets, 6- Coelenterate jelly, 7-Coelenterate tentacles, 8-Miscellaneous.

Fig. 1 Average % composition of food items

3 categories-active, moderate and poor for evaluation of the preference of food consumed .

Gastro somatic index

Monthly gastro somatic index (G.S.I) of *P.hamrur* was studied. A fall in G.S.I was noticed in females during November and December when compared to males. (Table 6). Feeding rhythm in the fish showed that there was no day-night variation in the feeding . Good to moderate rate of feeding was noted both during day and night.

Discussion

P. hamrur is found to be highly carnivorous. Zacharia *et al*, (1991) reported the carnivorous nature of this fish, feeding mainly on squids, lizardfish and *Therapon* spp. Also it feeds on prawns and other crustaceans. The dominant food item like *Solenocera* spp. observed in the gut of *P.hamrur* in the present study clearly indicates the deep-water habitat of the fish. The existence of prawn and prawn tissue as the major food component was reported in other species such as *P. macracanthus* and *P.tayenus* by Rao (1967,1984) and Lester (1968). Philip

Table 2. Monthly average (%) feeding intensity of male *P. hamrur* during 1997 and 1998

Month	No. of Fish	Empty	Medium	Heavy	Actively fed	Poorly fed
Jan.	20	14.2	30.95	54.77	85.72	14.28
Feb.	16	33.4	40.00	16.67	56.67	33.44
Mar.	20	25.0	62.5	12.5	75	25.0
Apr.	14	25.0	30.0	45.0	75	25.0
May	14	41.6	41.6	16.6	58.2	41.6
Jun.	16	25.0	25.0	50.0	75	25.0
Jul.	14	12.5	41.6	45.8	87.5	12.5
Aug.	16	0	100.0	0	100	0
Sep.	14	12.5	87.5	0	87.5	12.5
Oct.	12	0	75.0	25	100	0
Nov.	18	0	100.	0	100	0
Dec.	12	33.3	66.6	0	66.6	33.3
Av.		19.3	58.4	22.2	80.6	19.3

Table 3. Monthly average feeding intensity in female *P. hamrur* during 1997 and 1998

Month	No. of Fish	%Empty	%Medium	%Heavy	Actively fed	Poorly fed
Jan.	26	0	32.5	67.5	100	0
Feb.	22	6.2	35.4	58.3	93.7	6.2
Mar.	16	33.3	66.6	0	66.6	33.3
Apr.	18	12.5	77.5	10.0	87.5	12.5
May	16	25.0	50.0	25.0	75	25
Jun	18	20.0	80.0	0	80	20
Jul.	16	20.0	70.0	10.0	80	20
Aug.	16	36.6	63.3.	0	63.3	36.6
Sep.	14	0	90	10	100	0
Oct.	14	29.1	70.8	0	70.8	29.1
Nov.	12	100.0	0	0	0	100
Dec.	16	58.3	41.6	0	41.6	58.3
Av.		28.4	56.49	15.0	71.5	28.4

(1994,1998) and Premalatha (1997) observed fishes among the food items in the gut of *P.hamrur*. Sivakami *et al.* (2001) indicated that the most preferred food item of *P.hamrur* was pelagic crustaceans followed by fishes and other molluscs. The

results of the present study is also in agreement with the above views (Tessy and Inasu 1999).

Slight differences are noted among the sex groups and length groups of *P. hamrur* with respect to the consumption of

Table 4. Average feeding intensity (%) in 0 - 20 cm groups of *P. hamrur* during 1997 and 1998

Month	No. of Fish	Empty	Medium	Heavy	Actively fed	Poorly fed
Jan.	10	12.5	75.0	12.5	87.5	12.5
Feb.	10	50	33.3	16.6	50	50.0
Mar.	8	30	70.0	0	70	30
Apr.	4	0	100	0	100	0
May	8	75	25.0	0	25	75
Jun.	12	50	50.0	0	50	50
Jul.	4	0	50.0	50	100	0
Aug.	10	0	100	0	100	0
Sep.	6	0	100	0	100	0
Oct.	8	0	100	0	100	0
Nov.	10	0	100	0	100	0
Dec.	4	0	100	0	100	0
Av.		18.1	75.2	6.5	81.8	18.1

prawns. Females showed more affinity towards prawns than the males. Similarly the larger length group (20-40 cm) showed higher percentage of prawn food

compared to small size group (0-20cm). The variations in the availability of food organisms in the habitats are reflected in the diet of this fish. The present study also

Table 5. Average feeding intensity (%) in 20 - 40 cm groups of *P. hamrur* during 1997 and 1998

Month	No. of	%Empty Fish	%Medium	%Heavy	Actively fed	Poorly fed
Jan.	36	4.0	26.5	68.9	95.9	4.0
Feb.	28	6.2	48.7	45.0	93.7	6.2
Mar.	28	30.0	62.8	7.1	70.0	30.0
Apr.	28	14.5	47.9	37.5	85.4	14.5
May	22	16.6	55.0	28.3	83.3	16.6
Jun.	22	14.2	78.5	7.1	85.7	14.2
Jul.	26	18.7	58.7	22.5	81.2	18.7
Aug.	22	26.7	73.2	0	73.2	26.7
Sep.	22	7.1	85.7	7.1	92.8	7.1
Oct.	18	39.2	53.5	7.1	60.7	39.2
Nov.	20	58.3	41.6	0	41.6	58.3
Dec.	24	56.2	43.7	0	43.7	56.2
Av.		24.3	56.3	19.2	75.5	24.3

Table 6. Monthly G.S.I. of *P. hamrur* (male, female and pooled) during 1997 and 1998

Month	1997 G.S.I.			1998 G.S.I.		
	M	F	Pooled	M	F	Pooled
Jan.	3.3	4.7	4.0	3.7	3.9	3.8
Feb.	2.1	3.5	2.8	3.2	2.7	3.0
Mar.	1.6	2.4	2.0	3.9	2.7	3.3
Apr.	2.7	3.0	2.8	3.9	2.2	3.6
May	2.0	2.6	2.3	2.9	2.8	2.8
Jun.	2.5	2.0	2.3	4.6	2.5	3.5
Jul.	3.6	2.6	3.1	4.0	2.7	3.3
Aug.	2.9	2.3	2.6	3.1	2.4	2.8
Sep.	2.6	2.9	2.7	3.0	2.1	2.7
Oct.	3.8	2.4	3.1	2.9	2.4	2.7
Nov.	3.2	1.4	2.3	3.1	1.6	2.4
Dec.	2.6	1.7	2.7	2.4	1.8	2.1

revealed that *P. hamrur* is not a bottom feeder because sand grains and other coarse particles were not reported from its gut contents. Philip (1994) reported that most of the species of *Priacanthus* are column feeders and there were no sand coarse particles in their gut contents. Tamura (1959) observed that Priacanthids generally feed above and ahead of it. The oblique and upturned nature of the mouth supports this statement.

The maximum feeding intensity in *P. hamrur* was noticed during September (76.9%) and it was found varying in sex groups and length groups. The feeding intensity was higher in males (80.6%) than in females (71.5%). In the case of length groups, the feeding intensity was very high (81.7%) in immature group (0-20cm) while it was 75.5% in mature group (20-40cm). Menzel (1960) reported that the feeding efficiency and growth rate of *Epinephelus*

guttatus decreased with increase in size which is in agreement with the present studies. Feeding intensity in *P. hamrur* was high during January, February, July and December.

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