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Feeding Habits and Reproductive Biology of an Endemic Carp, *Osteobrama Cunma* (Day, 1888) of Manipur (Teleostomi: Cyprinidae)

Zoology

KEYWORDS : Cyprinid carp, Index of preponderance, Gastro-Somatic Index, Gonadosomatic Index

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ABSTRACT

The alimentary canal of Osteobrama cunma is a long tube with undifferentiated stomach. Pharyngeal teeth are present for crushing the aquatic plants which formed the main food item (40-60%). The maximum values of Gonadosomatic Index for males and females were observed during May (6.25) and June (13.9824) respectively. Absolute fecundity determined in the size range of 91-111.53 mm in total length and 6.89-17.77g in body weight ranged from 1001 egg for ovary weight of 0.91g to 7449 eggs for ovary weight of 1.91g. These findings will be important for pisciculture and fisheries resource management strategies as this is an endemic species whose population has declined drastically.

INTRODUCTION

Osteobrama cunma (Day) locally known as Ngasheksha in Manipuri is a minor carp endemic to the eastern part of Manipur, India and Myanmar (Chindwin drainage system). It is one of the most important food fishes in Manipur. However, the population of this species is reduced drastically from Manipur River and its tributaries. Hence high priority must be given to study the biology of the fish to enable breeding, culture and conservation.

Osteobrama cunma is closely related to *O. cotio* and *O. belangeri* in certain morphological characters. However, the species under study may be easily distinguished from the above species in having a combination of certain characters such as 48 scales on the lateral line; 9 scale rows of scales between dorsal-fin origin and the lateral line; 8 scale rows between lateral line and pelvic fin base; 20 predorsal scale; 26 branched anal fin rays and 20 circumpenduncular scales.

Information on natural food and feeding habits, nutritional requirement and general trophic ecology are paramount importance in any pisciculture venture (Bashuda and Vishwanath, 1999). Similarly knowledge on reproductive biology permits quantification of the reproductive capacity of individual fish (Murua *et al*., 2003).

There is no report on the biology of the *O. cunma,* therefore in view of its importance the present investigation was undertaken to elucidate the biology of the species. The findings of the investigation may help in breeding, culture, management and conservation.

MATERIALS AND METHODS

Food and Feeding Habits

The fresh specimens of *Osteobrama cunma* were collected every month from the Thoubal River during September, 2011 to August, 2012. The specimens were brought to laboratory, cleaned and wiped. The length and weight of individuals (60 nos.) were measured to nearest millimeter (mm) and gram (g), respectively. In order to examine the stomach conditions, fishes were dissected ventrally, and after recording the sex the stomachs contents were examined in fresh conditions. Weight of the stomach was also measured and the Gastro Somatic Index (GaSi) was calculated by following formula (Desai, 1970):

GaSI = (weight of the stomach × 100) / Total weight of the fish

In order to study the food composition, the stomach contents were emptied in a clean Petri dish and various food items were separated and identified up to generic or species level, wherever possible following the "point method" proposed by Hynes (1950). In some cases, the food items were found in advanced state of digestion, they were treated as digested matter. The occurrence and number of items in every stomach were noted for further study following the method of Index of Preponderance (Natarajan & Thingran, 1961).

$$I_i = (V_i . O_i / \sum v_i . O_i) \times 100$$

Where, "Vi" and "Oi" are the volume and occurrence index of food items in percentage respectively.

Relative gut length (RLG) was calculated as the ratio of intestinal length to the total body

Gonando Gomatic Index (GSI):

To study GSI weight of each specimen was taken to the nearest gram and after dissection the weight of gonad was also recorded every month. The ratio was calculated month-wise and sex-wise using the following equation (Vladykov, 1956).

GSI = weight of gonad × 100 / Total body weight

Fecundity:

The gravimetric method was used for studying fecundity following Hunters and Goldberg (1980). Twenty mature ovaries (preserved in 5% formaldehyde) were taken for the estimates of fecundity. Fecundity was estimated by counting the number of mature ova from a known weight of mature ovary i.e. 0.1g of subsamples was taken from three segments (anterior, middle and posterior) of each ovary. The sub samples were spread evenly on a counting slide with a few drops of water and the number of mature ova was counted and average number of three subsamples was used to determined fecundity by the following formula:

Fecundity = (No. of ova in the sub sample × Total ovary weight / weight of sample)

Relative fecundity i.e. number of eggs / 1g of body weight (unit body weight or ovary weight) was obtained by dividing absolute fecundity with total weight of fish.

RESULTS AND DISCUSSION

Gastro somatic index was found to be lowest during June to August in female (Table 1). Seasonal fluctuation of the feeding intensity and dietary composition in fishes are influenced not only by the maturation of gonads but also due to non availability of food (Shobana and Nair, 1980). The high occurance of low GaSI during the spawning season of fishes is perhaps due to less feeding since the mature gonads occupy more space in the ventral cavity. Similar findings were reported in the case of *Puntius vittatus* (Geetha *et al*., 1990).

Table 1. Month-wise Gastro-Somatic Index of *Osteobrama cunma*

Month	Female	Male	Pooled
January	4.5252	3.3428	3.934
February	4.7104	2.1641	3.4372
March	3.6526	2.8512	3.2519
April	3.9631	2.6005	3.2818
May	2.5106	2.1053	2.3079
June	0.5917	1.0438	0.8177
July	0.3636	2.4862	1.4249
August	0.8962	2.8241	1.8601
September	1.5284	2.5206	2.0245
October	1.8526	2.9051	2.3788
November	2.5661	3.4925	3.0293
December	4.0521	3.4638	3.7600

Percentage of food composition in *Osteobrama cunma* is shown in table 2. Macro vegetation (*Hydrilla, Lemna, Wolffia* etc.) was the predominant food item (72.3335%) followed by insect (13.7039) and algae (8.2590%) such as *chara* and *Spyrogyra*. Similar findings were observed by Bashuda and Vishwanath (1999) in *O. belangeri*.

Intestine is long, slender and coiled with more than one loop. The relative gut length was minimum in specimen with shorter total length and gradually increases in specimen with longer total length (Table 3). According to Bashuda and Vishwanath (1999) the anatomical features of the alimentary canal in a fish are related to the food and feeding habit. The alimentary canal of *Osteobrama belangeri* provides an excellent example of non mandibular teeth being used as the primary chewing apparatus. Pharyngeal teeth are present for crushing the aquatic plants which formed the main food item (40-60%) of the total food components. Similar observations were also observed in the present study.

Table 2. Index of preponderance of different food items of *Osteobrama cunma*

Food items	Volume %	Occurance %	ViOi	Index of preponderance
Macrovegetation	43.56	41.52	1808.6112	72.3335
Algae	20.63	10.01	206.5063	8.2590
Diatoms	5.14	6.08	31.2512	1.2498
Insects	12.94	26.48	342.6512	13.7039
Worms	6.65	4.56	30.324	1.2127
Zooplanktons	8.01	9.35	74.8935	2.9952
Digested matter	3.07	2.00	6.14	0.2455
Total	2500.3774			

Table 3: Gut length in relation to body length of *Osteobrama cunma*

Size group (mm)	No. of fish examined	Percentage gut length to total length of fish
50-60	5	68.8428
60-70	10	69.7421
70-80	8	75.8569
80-90	10	89.2148
90-100	10	108.5934
100-110	10	119.3422
110-120	4	124.3821
120-130	3	126.0586

The month wise distribution of gonadosomatic index is depicted in Table 4. The maximum value of GSI (3.4461) was observed during June for males, whereas, a maximum of 13.9824 was observed during May for females, indicating the peak spawning season of *O. cunma*. Absolute fecundity determined in the size range of 91-111.53 mm in total length and 6.89-17.77 g in body weight ranged from 1001 egg for ovary weight of 0.91 g to 7449 eggs for ovary weight of 1.91 g (Table 5). However the relative fecundity ranged from 89 to 545 eggs per gram of body weight.

Table 4. Monthwise Gonadosomatic Index of *Osteobrama cunma*

Month	Male	Female
January	1.0406	6.2504
February	0.8625	8.1032
March	1.5244	10.1401
April	1.4822	10.0831
May	2.2702	13.9824
June	3.4461	11.9302
July	2.1506	11.1401
August	3.7704	12.0026
September	2.5528	10.9426
October	1.1520	8.8910
November	1.0557	4.6444
December	1.0070	4.9959

Table 5. Fecundity of *Osteobrama cunma*

Total length (mm)	Body weight (g)	Ovary weight(g)	Absolute fecundity	Relative fecundity with respect to body weight
103.63	13.66	1.91	7449	545
95.44	12.41	0.62	1953	157
95.10	11.23	0.91	1001	89
93.92	12.00	0.75	2055	171
91.00	10.46	0.93	1869	178
98.98	11.13	1.24	2281	204
111.53	17.77	2.12	4876	274
93.28	11.16	1.25	2437	210
92.14	10.58	1.05	2065	195
94.88	11.82	1.14	2229	188

CONCLUSION

The present findings will be useful in induced breeding, culture, stock assessment and conservation of *Osteobrama cunma*. This species may be tried in composite fish culture in place of grass carp, *Ctenopharyngodon idella* and *O. belangeri* because of the similar food and feeding habits of these fishes.

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