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FOOD AND FEEDING HABITS OF TWO FRESHWATER FISHES, *OMPOK BIMACULATUS* AND *O. MALABARICUS* OF RIVER AMARAVATHY, TAMIL NADU

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ABSTRACT
The two freshwater fishes, Ompok bimaculatus and *O. malabaricus* are found to be omnivorous, feeding mainly on vegetable matter and fish, which dominated the list with a percentage of 30.04. Vegetable matters take the precedence with an average percentage of 28.65 for twelve months Crustacean adults, crustacean larvae, insect and molluscs are identified as secondary and supplementary foods. The percentage frequency of occurrence of fish and vegetable matter, and crustaceans in the gut contents of both the species are more than the other food items. Feeding intensity was more in December (48.3%) with minimum (34.4%) in May for *O. bimaculatus* and was more in March (63.5%) with minimum (32%) in October for *O. malabaricus* The occurrence of empty stomach was found to be more during the peak breeding season, in both the species.

INTRODUCTION

Feeding is the dominant activity of the entire life cycle of fish (Royce, 1972). The success of planning and management of fishery depends on the knowledge of their biology in which 'food and feeding habits' include a valuable portion. The occurrence, distribution and abundance of fish stock mainly depend on the availability of food. Hence the quantum of fish production is directly related with the nutrition available to it. The study of the food and feeding habits in fish species is a subject of continuous research because it constitutes the basis for the development of a successful fisheries management (Oronsaye and Nakpodia, 2005). Analysis of contents in the gut and features of the alimentary system provide information on food, feeding habits and selective feedings, if any, in fishes. In addition it can show shifts in food source, which may be an indicator of immediate risks of direct predation upon themselves (Paszkowski *et al*., 1996).

In freshwater fisheries management and aquaculture, the evaluation of natural food biomass is important. This is the primary source of food, as in many cases. Gaining knowledge on the most utilized and most easily obtainable nutritive food source are all of importance, as all these factors aid the development and growth rate of the species further up the food chain. Hence the present study has been undertaken.

MATERIALS AND METHODS

Study area

The study area is located 20 km south of Udumelpet Taluk in Coimbatore District, Tami Nadu, India, at 10º29' NL and 77º10' EL. Random samples of two species *Ompok bimaculatus* and *O. malabaricus* were analyzed for their food and feeding habits in the study. Fish specimens were collected monthly between Aug 2005 and July 2006.

Analysis of gut contents was done using frequency of occurrence and numerical methods as described respectively by Hyslop (1980) and Costal *et al*. (1992). The degree of fullness of the stomach was noted before opening the stomach, to ascertain the feeding intensity during various months of the years. For convenience, 'gorged', 'full' and '3/4 full' stomachs were clubbed together and were termed as 'actively fed'; '1/2 full' as 'moderately fed'; and '1/4 full' stomach as 'poorly fed' fishes. The percentage frequency of 'actively fed', 'moderately fed', 'poorly fed', 'trace' and 'empty' and stomachs were calculated from the total number of fishes examined in a month. For graphic depiction 'trace' stomachs are included in 'empty' entities.

RESULTS

Percentage composition of food

From the Table 1 it can be stated that in *O.bimaculatus* fishes and vegetable matter were preferred as the primary food item in all the seasons. On average for all months of the study period, fish dominated the list with a percentage of 30.04. The other food items in descending order are vegetable matter

Table 1: Percentage occurrence of various food items, in relation to different months of *Ompok bimaculatus*

Months	No. of fishes examined	Vegetable matter	Crustacean larvae	Crustacean nymphs	Crustacean adults	Insects and their larvae	Molluscs	Fishes	Misc.
Aug	96	47.8	6.3	4.2	10.8	3.1	10.0	16.7	1.1
Sep	87	21.0	6.3	20.7	3.9	15.4	5.1	24.9	2.6
Oct	102	12.9	16.9	10.7	11.7	5.9	10.0	30.9	1.0
Nov	74	34.2	4.1	9.5	16.2	5.8	7.0	20.1	3.1
Dec	78	20.7	6.5	5.1	24.8	21.0	3.9	15.4	2.6
Jan	64	18.8	7.8	14.1	12.5	3.0	3.2	39.0	1.6
Feb	89	19.1	5.6	16.9	10.1	4.5	4.5	36.0	3.3
Mar	67	14.8	1.4	14.8	10.8	4.6	4.5	47.6	1.5
April	85	21.1	5.6	8.5	14.3	2.4	2.4	44.2	1.5
May	74	30.5	6.7	9.4	14.9	2.7	5.4	29.0	1.5
June	96	15.8	5.3	17.7	12.5	4.3	7.8	34.8	1.8
July	96	15.6	20.8	4.2	9.3	19.7	3.2	21.9	5.3

Table 2: Percentage occurrence of various food items, in relation to different months of *Ompok malabaricus*

Months	No. of fishes examined	Vegetable matter	Crustacean adults	Crustacean nymphs	Crustacean larvae	Insects and their larvae	Molluscs	Fishes	Misc.
Aug	35	22.8	16.7	12.4	23.0	4.2	6.2	12.5	2.2
Sep	81	49.5	6.2	8.6	6.2	5.9	6.2	16.0	1.5
Oct	85	25.9	17.1	29.4	3.5	9.4	8.3	4.1	2.4
Nov	88	18.8	12.5	8.0	15.9	9.1	12.5	21.6	1.7
Dec	89	18.2	32.8	6.7	4.5	5.6	9.7	21.4	1.0
Jan	93	19.5	13.0	10.7	7.5	6.4	7.0	34.3	1.6
Feb	86	34.8	4.6	19.8	3.5	10.6	9.3	13.9	3.5
Mar	83	36.3	15.7	9.6	4.8	6.0	10.8	14.4	2.4
April	87	37.1	5.5	4.4	2.4	9.1	15.8	23.8	2.0
May	84	18.2	9.0	6.0	4.4	23.8	6.7	29.6	2.4
June	93	18.4	11.8	6.5	2.1	6.5	5.4	47.3	2.2
July	63	44.3	6.8	12.7	14.3	6.4	11.2	3.2	1.1

Table 3: Percentage occurrence of feeding intensity, in relation to different months of *Ompok bimaculatus*

Months	No. of fishes	Empty	Trace	1/4 Full	1/2 Full	3/4 Full	Full	Gorged
Aug	128	4.6	25	12.5	18.5	14	7.8	17.6
Sep	97	10.3	15.5	16.6	11.3	20.5	13.4	12.4
Oct	120	5.3	15	19.2	18.3	20	13.9	8.3
Nov	86	7	14	14	17.4	23.3	12.8	11.5
Dec	91	9.9	14.3	13.2	14.3	22	12	14.3
Jan	75	8	14.7	16	14.7	20	12	14.6
Feb	105	8.5	16	17	14.2	21.7	12.3	10.3
Mar	80	8.7	16.4	18.7	13.7	20	12.5	10
April	101	11.8	15.9	14.9	12.9	18.9	13.8	11.8
May	92	14	20.4	17.2	14	16.2	8.6	9.6
June	113	7.98	15.7	22.1	19.2	14	11.4	9.62
July	126	7.14	25.4	16.6	13.5	11.9	7.96	17.5

(22.69%), crustacean adults (12.66%), crustacean nymphs (11.32%), crustacean larvae (7.78%), insects (7.7%) molluscs (5.58%) and miscellaneous organisms (2.24%). Fluctuations in percentage values of the remaining food items could be seen with regard to the seasons. There is no undue variation in the order of preference of the food items during pre-monsoon and monsoon seasons.

Table 2 illustrates the food matters recorded for *O. malabaricus*. It is decipherable that the vegetable matters take the precedence with an average percentage of 28.65 for twelve months. The other food in descending order are fish (20.17 %), crustacean adults (12.64 %), crustacean nymphs (11.23 %), molluscs (9.09 %) insects (8.58 %) crustacean larvae (7.67%), and miscellaneous organisms (1.98%). Variations though not undue, still occurred among the food substances, in different seasons.

Feeding intensity

Table 3 shows the percentage of feeding intensity, for the pooled sample, in relation to different months in *Ompok bimaculatus*. From this table it is found that the actively fed state was more in December (48.3%) with minimum (34.4%) in May. Moderately fed state was found more (19.2%) in June with minimum (11.3%) in September, and poorly fed was more (22.1%) in June with minimum (12.5%) in August.

Table 4 shows the monthly percentage occurrence of feeding intensity, in *Ompok malabaricus*. It is decipherable that the actively fed state was more in March (63.5%) with minimum

Table 4: Percentage occurrence of feeding intensity, in relation to different months of *Ompok malabaricus*

Months	No of fishes	1/4 Full	1/2 Full	3/4 Full	Full	Gorged	Empty	Trace
Aug	48	10.5	4.2	10.5	14.6	16.6	16.6	27.0
Sep	97	15.5	18.6	11.3	10.3	14.4	13.4	16.5
Oct	100	21.0	14.0	19.0	7.0	6.0	18.0	15.0
Nov	101	10.9	19.8	7.9	11.9	20.8	15.8	12.9
Dec	95	19.4	10.5	14.7	18.9	25.3	5.2	6.0
Jan	110	14.6	7.2	18.3	13.6	9.1	21.8	15.4
Feb	106	6.6	20.4	17.7	12.2	8.4	15.1	19.6
Mar	93	9.6	7.5	21.5	19.4	22.6	8.6	10.8
April	96	26.0	5.2	14.6	21.9	7.3	15.6	9.5
May	94	14.9	17.0	16.4	12.8	19.1	9.2	10.6
June	114	7.0	8.8	13.2	16.7	20.2	15.7	18.4
July	68	13.2	16.2	22.1	17.7	14.7	8.7	7.4

(32%) in October. Moderately fed state was found more (20.4%) in February with minimum (4.16%) in August. The poorly fed was more (26%) in April with minimum (6.6%) in February.

DISCUSSION

From the observations on the gut contents of *O. bimaculatus* and *O. malabaricus*, it can be concluded that they are omnivorous (both in juveniles and adults), feeding mainly on vegetable matter and fishes. In addition, they consume crustacean adults, crustacean larvae and insects as main food. The zooplankton, nektons, tadpoles, annelid worms and molluscs are also observed as food items. However, since the percentages of these items vary, they could be the supplementary food items for these fishes. The omnivorous habit in other fishes have been observed by Mookerjee *et al*. (1948 and 1950); Alikunhi (1956); Qayyam and Qasim (1964); Reddy (1980); Bais *et al*. (1994); Dutta (1994); and Rao *et al*. (1998).

The food substances observed in the gut like vegetable matter, fish scales, crustaceans, molluscs, plant parts, and mud are distributed throughout the different layers of the water bodies. Hence it can be interpreted that both species of *O. bimaculatus* and *O. malabaricus* cannot be labelled as surface or bottom feeders. Both vegetable matter and fish scales as the observed food matters enable them to be identified as omnivorous.

The poorly fed state in adults of *O. bimaculatus* was seen more in August and of *O. malabaricus* in June. This corresponds with the period of spawning. Thomas (1969) stated that this low feeding activity may not be due to shortage of food items but due to the spawning season of the fish. When the abdominal cavity is filled up with the enlarged ovary, the stomach would not be filled up with food substances as there is no volume to accommodate **(**Rao *et al*., 1998 and Joadder, 2006**).**

Dewan and Saha (1979) reported that the low feeding activity of adult *Tilapia* in the months of February to June. This is associated with fecundity rendered by the replenished supply of the water produced by heavy rain fall. And as expected, the immature fishes were found to be actively feeding in these months too. Empty stomach may be due to the fact that the food items have been regurgitated or digested as the fish struggled for escape in the traps and gill nets. It was observed that specimens caught with cast net had lesser amount of empty stomach. Thus, cast netting may be recommended for study of food and feeding.

Keast (1965) reported that many fishes change their food habits as they grow. These findings clearly indicate that the food and feeding habits in both species vary as they grow form juvenile to adults. Allen (1935) stated that the frequency of state of empty stomach is dependent on the ratio between the size of the fish and size of the prey. This explains that the piscivorous nature is more in adults.

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