

Food Selection and Feeding Habits of *Tilapia mossambica* Peters in Different Ecological Habitats

C M ARAVINDAN*

Department of Aquatic Biology and Fisheries
University of Kerala, Trivandrum 695007

Selectivity index of *Tilapia mossambica* Peters in three different ecological habitats viz. a pond, a river and an estuary is reported. *T. mossambica* is selective in its feeding habits. Preference for food was as follows in pond aquatic plant material, in river filamentous algae, ostracods and copepods and in estuary plant matter.

Key Words: *Tilapia mossambica*, Food preference, Selectivity index, Trophic ecology

Introduction

The Mozambique oral brooding cichlid, *Tilapia mossambica* is a native of South Africa introduced into Indian waters as early as 1952 (Devadas & Chacko 1953). The main object in introducing the fish into this subcontinent was to find out its suitability in fish farming. Because of its prolific breeding habits and easy acclimatisation to varying conditions, *T. mossambica* was able to establish itself quite well to conditions prevailing here. Presently it has become a dominant member of the fish fauna of almost all water bodies of Kerala. Because of the wide ecological variation of its habitat,

a study of its trophic ecology in relation to these habitats will be interesting. An estimation of the available food in the habitat and the stomach contents of the fish inhabiting them will help in finding out the selectivity, if any, this fish shows with respect to food items. Even though information is available on the feeding habits of *T. mossambica* (Vaas & Hofsted 1952, Chen 1953, Panikkar & Tampi 1954, Kelly 1956) no attempt has hitherto been made to find out whether the difference in the habitat exerts any influence on the feeding of the fish. Alkholly & Malek (1972) have reported on

*Present address: Marine Biology Station, University of Dar es Salaam, P.O. Box 35064, Dar es Salaam, Tanzania

the feeding nature of *T. zilli* from different areas of Lake Quarum. Such information is of considerable importance from the point of view of the ecology of the fish and an attempt was made to gather information on its feeding habits in different habitats.

Materials and Methods

Three different types of habitats were selected, namely

- (i) A temple tank about 10 hectares in area representing a confined fresh-water body
- (ii) A river (Karamana river) near Trivandrum city as an open-water body and
- (iii) A brackish water lake (Kayamkulam lake) representing an estuarine habitat where the salinity may rise up to about 20‰ (John 1958).

T. mossambica samples collected from these localities in April 1974 were used for analysing the gut contents. After recording the total length & weight of the fish, and weight of its gut, the gut was preserved in 5% formalin. Analysis of the gut contents was made by the percentage occurrence method. In the early morning of the day of collection of the fish, a sample of plankton was also collected and the relative percentage of various items in the environment was determined.

Selectivity index E was calculated using the formula described by Ivlev (1961):

$$E = \frac{ri - pi}{ri + pi}$$

where E is the selectivity index, and ri and pi the percentages of food item in the gut and in the environment respectively.

The value of E ranges from +1 to -1. The former denotes a complete positive, while the latter a complete negative selectivity. A value of 0 represents complete absence of any selectivity.

Results

Data regarding the percentage occurrence of various food items in the gut contents, percentage of the same items in the environment and selectivity index of *T. mossambica* from the three habitats are presented in table 1. From the table it can be seen that in fish collected from the pond, selectivity is strongly positive to food items like filamentous algae, higher aquatic plants and detritus, and negative in the case of unicellular algae, copepods and crustacean larvae.

In river fish, selectivity is positive in the case of filamentous algae and ostracods while it is 0 in the case of unicellular algae. Crustacean larvae are completely absent in the gut while copepods are seen in small numbers.

In estuarine fish also, selectivity is higher towards filamentous algae and detritus, but very low towards unicellular algae. With regard to fish eggs and larvae, coelenterates, polychaetes and molluscan larvae the selectivity index is negative in all the cases.

Discussion

A perusal of the results reveals that *T. mossambica* is selective in its feeding habits in different environments. Even though filamentous algae, unicellular algae, copepods, and detritus are abundant in the pond, the fish showed a marked preference for aquatic plant material. In the river, though unicellular algae were available in fair amount, the fish showed a noticeable preference for filamentous algae, ostracods and copepods. In the estuary the fish ate plant matter, but supplemented it with fish eggs and larvae, and mysids.

These results suggest that, given the choice, *T. mossambica* will prefer plant to animal matter. Even with regard to plant matter selectivity is discernible with

Table 1 Percentage occurrence of various food items in the gut of *T. mossambica* and in the environment and the selectivity index in the three habitats

Food Items	Pond			River			Estuary		
	ri	pi	E	ri	pi	E	ri	pi	E
Unicellular algae & diatoms	68.0	90.0	-0.14	80.0	80.0	-0—	25.0	20.0	+0.11
Filamentous algae	5.5	—	+1.00	3.0	—	+1.00	10.0	—	+1.00
Higher aquatic plants	3.0	—	+1.00	—	—	—	—	—	—
Protozoans	2.0	1.0	+0.33	2.0	2.0	-0—	—	5.0	-1.00
Rotifers	1.5	1.0	+0.02	2.0	2.0	-0—	—	—	—
Copepods	3.0	5.0	-0.25	6.0	4.0	+0.20	10.0	25.0	-0.42
Crustacean larvae	—	1.5	-1.00	—	2.0	-1.00	3.0	5.0	-0.25
Aquatic insect larvae	2.0	1.5	+0.02	5.0	10.0	-0.33	—	—	—
Fish eggs & larvae	—	—	—	—	—	—	1.0	10.0	-0.81
Mysids	—	—	—	—	—	—	7.0	5.0	+0.16
Ostracods	—	—	—	2.0	—	+1.00	—	—	—
Coelenterates	—	—	—	—	—	—	—	15.0	-1.00
Polychaetes	—	—	—	—	—	—	3.5	5.0	-0.17
Molluscan larvae	—	—	—	—	—	—	5.0	10.0	-0.33
Detritus	15.0	—	+1.00	—	—	—	35.0	—	+1.00

ri, Percentage of food items in the gut; pi, percentage of food items in the environment
E, the selectivity index

preference for filamentous algae to aquatic plants and unicellular algae.

Suyehiro (1942) suggested that in the fresh-water habitat diatoms, crustaceans, aquatic insect larvae etc., are the main items of food available and hence the food of the fishes in this habitat is confined to this narrow range. But estuaries are frequently areas of high fertility and therefore of high biological productivity. This is reflected in the dense stands of sedentary organisms providing a plentiful supply of food both for adults and larvae of many species (Ketchum 1967). This environment is therefore ideal for feeding and breeding of a number of euryhaline organisms. Moreover, estuaries represent zones of reduced competition and the number of individuals may be quite large (Kinne 1966). These factors make the

fishes inhabiting this area omnivorous in their feeding habits.

As observed by Allen (1941) even though the selective mechanism is the result of the particular behaviour of a fish, the availability of the preferred item of food is entirely dependent on the environment. *T. mossambica* apparently shows a preference for plant material (Chen 1953, Hora & Pillai 1962, Hey 1971); nevertheless it is not averse to taking animal food (Le Roux 1956, Malek 1972 a, b). This suggests that the fish is a versatile feeder which accounts for the great success of the species.

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