

CHAPTER VI

DIETARY ANALYSES

6.1 Introduction

The understanding of fish diet and its influence on growth is essential to understanding the ecological role and the productive capacity of many populations. A study of the food and feeding habits of fish is very important in any fisheries research programme. Assessment of the food and feeding habits of fish helps us to determine its niche in the ecosystem and its preferred food items. It tells us how much the food spectrum of a fish overlaps with that of the co-existing fishes. The analysis of food components in the gut of a species from different habitats provides the information on how much the species is selective in the choice of food and how flexible it is in feeding on different food items (Mercy *et al.*, 2002).

The feeding habits of fishes are reported to vary with age, season and food availability (Kottelat *et al.*, 1993). This age related information on feeding behaviour is very important in hatchery and nursery practices. Fishes have been reported to play an active role in dispersal of seeds from the fruits dropped into waters (Kottelat *et al.*, 1993).

The reports on the feeding habits of fishes inhabiting in streams are limited compared to marine species. This could be attributed to the difficulties in conducting such studies in the natural conditions, especially on the rare and endangered ones. The food and feeding habits of some freshwater fishes were studied by Menon and Chacko (1958), Rajan (1965), Antony (1977), Kurup (1993), and Kurian and Inasu (2001). According to Shaji (1998), the larger species of *Puntius* and *Neolissochilus* could be playing an important role in seed dispersal.

The specimens for the analysis were collected from various river systems of southern Kerala. Five hill stream fishes are selected for the study. They are: *Osteochilus longidorsalis* from Chalakudy, *Bhavana australis* from Periyar, *Nemacheilus keralensis* from Meenachil, *Garra hughii* from Pambar, and *Barilius bakeri* from Pamba rivers.

6.2 Methods

Five species of fishes were selected for dietary analyses. Samples were collected during the pre-monsoon period. The specimens were preserved in 10% formalin immediately after the collection and were brought to the laboratory for further analysis. Care was taken to avoid disgorgement while preserving specimens by immediate transfer into formalin.

The extent of feeding was determined by the degree of fullness of stomach and expressed as (i) empty (E), when the gut is empty; (ii) trace (T), when the gut is almost empty, (iii) poor (P), when the gut contained very little food and not distended, (iv) moderate (M), when the gut is half-full and only slightly distended, (v) good (G), when gut is full and distended; (vi) heavy (H), when the stomach is gorged with food and fully distended. Depending upon the degree of fullness of the gut, points 50, 40, 30, 20, 10 and 0 were given to heavy, good, moderate, poor, trace and empty gut, respectively.

The index of preponderance (I) was worked out as proposed by Natarajan and Jhingran (1962)

$$I = \frac{O_i \times V_i \times 100}{\sum O_i \times V_i}$$

Where, O_i is the index of occurrence and V_i is the index of volume.

6.3 Result and discussion

During the present study it was found difficult to determine the species or even genus to which the different food items belonged, as they were subjected to the strong action of digestive juices. Hence the food items were classified only as groups or divisions.

The result of dietary analysis indicate that the most frequently utilized food bases in hillstreams were terrestrial and aquatic insects, small and filamentous algae and plant matter. Based on the major diet, four trophic classes viz. algivore, insectivore, herbivore and omnivores were identified among the fishes studied.

The Index of Preponderance studied for various fishes are given in the Figures 6.1 to 6.5. The results showed that *Garra hughii* from Pambar river and *Bhavanaia australis* from Periyar river prefers algal diet. About 65% food of *G. hughii* is constitute as algae, and sand and detritus form the rest (Fig. 6.1). But in *B. australis* diet constitute about 85% of algae (Fig. 6.2). The presence of sand grains in the digestive tract of both species may be due to the accidental entry along with detritus.

The primary food items observed in the gut of *Barilius bakeri* from Pamba river are insects (81%). Some amount of plants and little algae are also found in the diet (Fig. 6.3)

Osteochilus longidorsalis from Chalakudy river is primarily a herbivore feeding on plants, seed grains and algae (Fig. 6.4). The predominant food item is plant matters (62%). Due to the presence of seed grains (30%), it could be playing an important role in seed dispersal.

In the case of *Nemacheilus keralensis*, the primary food item observed in the gut contents are algae (48%), invertebrates (33%) and little amount of plants with detritus (Fig. 6.5). Large quantities of red algae *Batrachospermum* is identified from the collection site of *N. keralensis* (Vagamon area of Meenachil river). They are mostly attached to the rocky or sandy bottom of the streams.

According to Menon and Chacko (1958), fishes feeding on filamentous algae, molluscs and worms and in whose gut content, sand grains are found in fair proportion, are to be placed under the group of bottom feeders. Considering this features, all the five species analysed, except *B. bakeri* could be categorised as bottom feeders

The distinct preference to benthic flora and fauna is probably a reflection of the behaviour of species which spend most of the time in benthic zone, as the material in the digestive tract faithfully reflects relative environmental densities of food items falling within the ingestible size range (Mercy *et al.*, 2002).

The fishes can also be utilized in the point of view of public health. Menon and Chacko (1958) presents application of data on food and feeding habits to such areas

as to combat algal blooms, thick aquatic vegetation; control of mosquito larvae, control molluscs etc

Feeding habit is one of the primary criteria in deciding on transpl^{nta}ation of species to new ecosystems with least possible damage or competition to the native fauna or its utility in overall production enhancement. According to Dutta (1996) fish feeding pattern varies not only in different areas but even in different waters of the same area and this variability is due to ecological factors including availability and abundance of preferred fish food.

Of the five species studied only *B. bakeri* is surface oriented, all others are benthic form with inferior mouth.

Fig. 6.1. Index of preponderance - *Garra hughi*

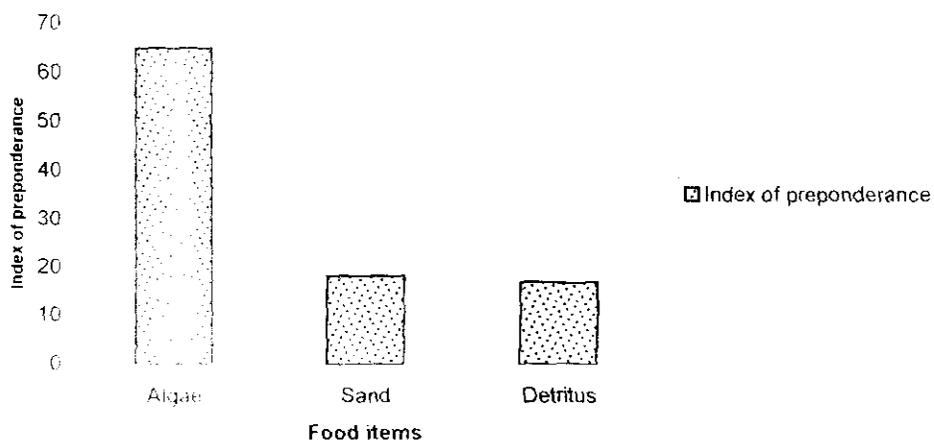


Fig. 6.2. Index of preponderance - *Bhavanaia australis*

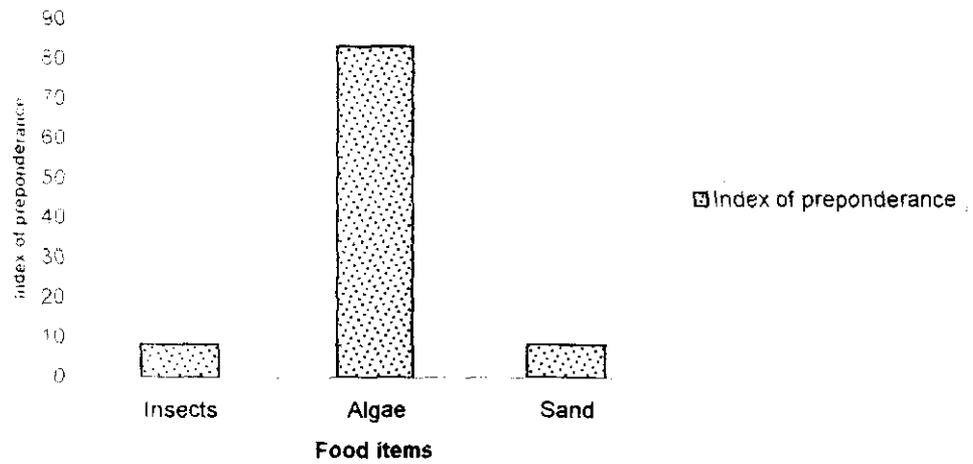


Fig. 6.3. Index of preponderance - *Barilius bakeri*

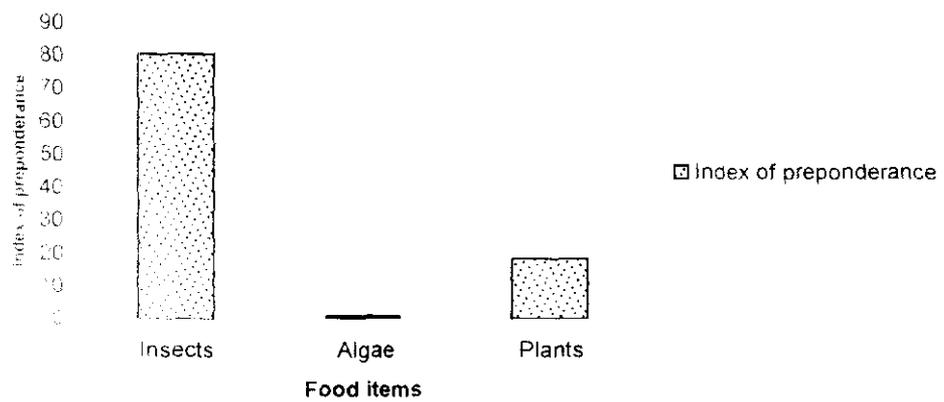


Fig. 6.4. Index of preponderance - *Osteochilus longidorsalis*

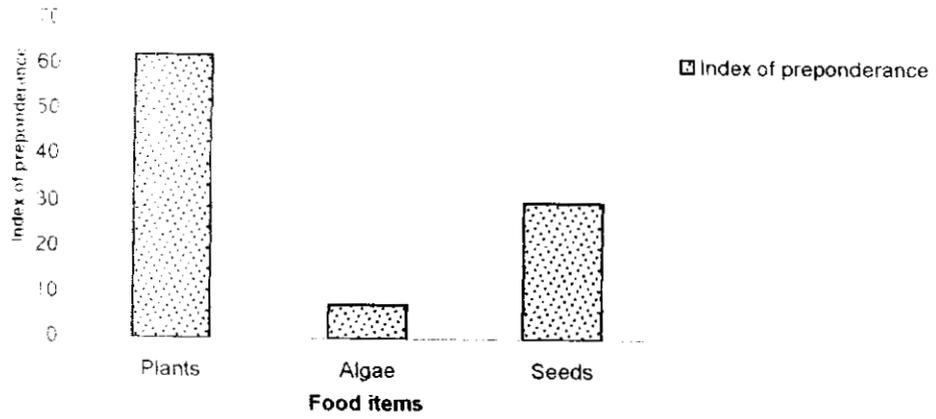


Fig. 6.5. Index of preponderance - *Nemacheilus keralensis*

