

FOOD PREFERENCE IN THE CULTURED SPECIES, *PENAEUS MONODON* FABRICIUS (CRUSTACEA: DECAPODA)

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ABSTRACT: The study of food preference is necessitated by the need to promote coastal culture of shrimps in Pakistan. The cultured *Penaeus monodon* was selected for study. Food preferences have been examined through the analysis of the gut contents. The shrimp shows a seasonal variation in its preference to food and feeding.

KEY WORDS: *Penaeus monodon* - Food - Feeding - Culture ponds.

INTRODUCTION

Besides boosting the natural catch, many developing countries are specializing in fish and shrimp farming thus adding appreciably to their foreign exchange earning. Pakistan has rich natural resources. The shrimp export is a major contributor to the foreign exchange earning, about 85 percent of the total foreign exchange is earned by the shrimp industry (Khan, 1990). Fishery export earnings can be substantially increased by reorganising the fisheries and employing scientific methods of fishing and preservation. Using modern aquaculture techniques, the country can benefit immensely.

Food is one of the important parameters for determining the growth and survival of shrimps. Thus understanding of the food requirements at different stages of growth and under culture conditions is of vital importance. Further, the formulation of an adequate feed is of paramount importance to the commercial venture of shrimp culture.

A number of factors are involved in achieving optimum results regarding the type of food given to the species under culture. These include the nature and amount of food, time of feeding, interaction of environmental factors and feeding behaviour, relationship between feeding activity and processes of gonadal development. Meyers (1989) mentioned two areas of current investigative activity in commercial penaeid aquatic diets. One is the effect of squid protein on penaeid shrimp growth and the other is the effect of lecithin and lipid on growth and survival.

Penaeus monodon has been identified as one of the most suitable species for coastal aquaculture. Farming of this species at 'Lipton' farms was made possible by its adaptability and resistance to varying environmental conditions.

MATERIAL AND METHODS

The specimens for the present study were supplied by 'Lipton' (Pakistan) Ltd. farm located at Ghorabari Creek (District of Thatta). They were fed with artificial food pellets during pond culture. From May to October 1988, except July, a total of 109 specimens (size range 8.0-23.2 cm) were studied. Just after collection, samples were fixed in 5% formalin for 24 hours and then preserved in 70% alcohol for further studies. Total length

(from tip of the rostrum to tip of telson) and body weight were noted. Measurements were recorded to the nearest 1.0mm, whereas weights were taken to the nearest 0.01 gm.

Stomach of each shrimp was dissected out, weighed (volumetrically) and washed in tap water. The content were diluted to 25cc, of which 10cc was taken; spread on the counting tray and were microscopically examined. Identification of food items was based mostly on skeletal remains and fragments of composed vegetation.

RESULTS

The gut content analysis reveals that shrimps consume a variety of food depending on the locality and availability of food items (coming with the incoming water into the ponds). Remains of crustaceans and vegetable matter were found most frequently and constituted the bulk of the food items. Crustaceans occurred in 39.66%; vegetable matter was the next most abundant food item representing 29.91%. Molluscs constituted only 0.17%. The contribution of fish remains was 0.78% and polychaetes occurred in 1.44%. Food pellets were found to constitute the third most important food item (19.01%). Information on the changes in the percentage of food items during different months of the study period for *P. monodon* is shown in table 1. As would be expected, sand particles were also found in the gut, however, these were not taken into consideration.

The crustaceans in the gut increased from 26.22% in August to 72.60% in October. The vegetable matter decreased from 40.18% in May to 5.80% in October. Some food items such as molluscs and pisces (fish larvae and scales) were, however, found only in one or two months (Table 1).

Table 1. Percentage of food items taken by cultured *Penaeus monodon* in different months.

Food items	May	June	July	Aug.	Sept.	Oct.
Digested matter and detritus	8.21	14.20	-	15.13	3.44	5.72
Vegetable matter	40.18	30.08	-	38.80	33.95	5.80
Animal matter						
a. Crustaceans	28.44	41.83	-	26.22	26.21	72.60
b. Non-crustaceans		3.60	1.82	-	-	5.05
Food pellets	18.72	12.03	-	19.23	29.36	15.25

An attempt has been made to study the food contents of *P. monodon* by dividing the food items into four broad categories; (a) digested matter and detritus, (b) vegetable matter, (c) animal matter - crustaceans and non-crustaceans, (d) food pellets.

The above categorization (a-d), was made for an overall comparison of feeding habits. Changes occurring in the above mentioned food groupings during the study period are presented in figure 1.

It is evident from the results that there is an inverse relationship between crustacean and vegetable matter. There are, however, samples in which vegetative matter is more

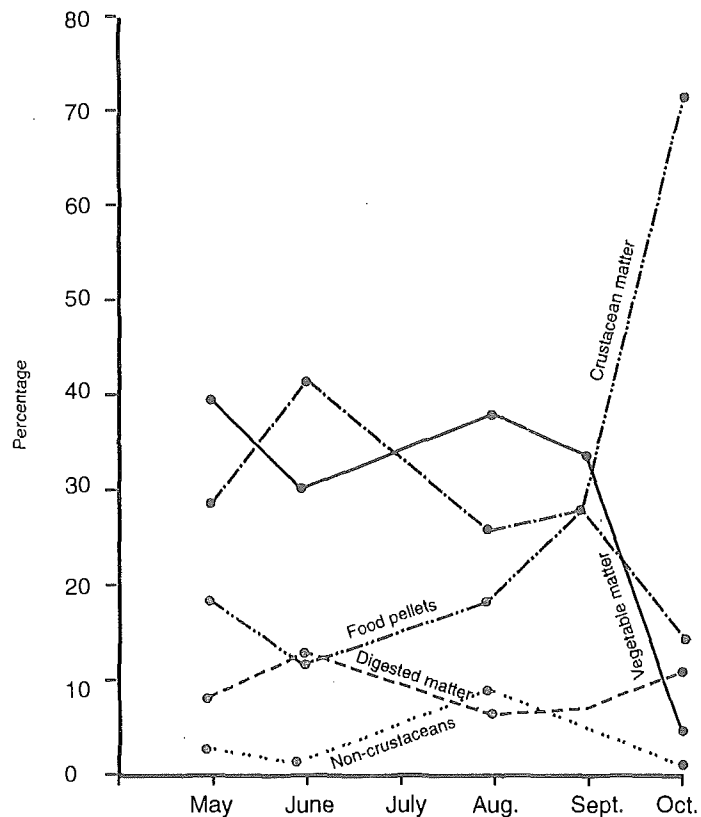


Fig.1. Seasonal variation of food items in *P. monodon*.

abundant than crustacean matter. Moreover, crustacean are the most abundant food item, whereas, the non-crustaceans are the least abundant food item.

DISCUSSION

Shrimps, in general, are omnivorous and detritus feeders. Investigations concerning analysis of stomach contents of penaeid shrimps have been made by several workers, Chopra (1939), Forster (1951), Panikkar (1952), Gopalakrishnan (1952), Dall (1968), Thomas (1973), Marte (1980), Das (1982), Hill and Wasserberg (1987) and Tirmizi (1978, unpublished).

Chopra (1939 cited in Gopalakrishnan, 1952:69) mentioned that shrimps "eat practically any food, living or dead, that comes in their way". According to Panikkar (1952), the food of young penaeids consists of organic detritus, algae and minute organisms in the mud. Thomas (1973) conducted detail studies on stomach contents of shrimps and found that the food of *P. monodon* consisted of crustaceans, molluscs, polychaetes, fishes and vegetable matter in order of abundance.

The results of our study show clearly that the shrimps prefer natural food. They also show that in order to achieve significant improvement in the growth of penaeid shrimps, a feeding formula needs to be developed. It is imperative that there must be a high energy, low cost feed formula in order to maintain a steady growth rate in cultured shrimp.

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