

Stomach Content of the Pink Shrimp (*Penaeus notialis*) from Abonnema Creek, Rivers State, Nigeria

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DOI: 10.56201/rjpst.v7.no6.2024.pg62.66

Abstract

The stomach content of the pink shrimp (*Penaeus notialis*) from Abonnema Creek, Rivers State Nigeria was studied for its food preferences. The fish' gut content was studied using numerical and frequency of occurrence methods. *Cyclotella atomia* (46.09) was the most preferred food item based on analyses using index of food significance (IFS). Other items consumed were: (Bacillanophyceae) *Melosira varians*, *Melosira distans*, *Cyclotella glomerata*, *Diatoma elongatus*, (Cyanophyceae), *Anabaena spiriodes*, *Spirulina sp*, *Raphidiopsis curvata*. and (Chlorophyceae) *Cladophora sp*. Regression analysis of length-weight data showed that the fish growth was negative allometric (2.4059 ± 0.0689), while condition factor which was estimated by the equation $K = W/aL^b$ gave a value of 0.4073261 ± 0.2018464 . *P notialis*, fed mainly on algae in this study and therefore would perform well on a moderate protein compounded feed if raised in captivity.

Key words: Crustaceans, Penaeidae, food, feeding, habit.

INTRODUCTION

Estuaries, coastal marine waters, and lagoons are the typical habitats of *Penaeus notialis*. They spend the day in the muddy bottom of the habitat and migrate upstream at night. The pink shrimp is an essential type of sea food, native to the West African region, *Penaeus notialis*, or pink shrimp, is a significant component of Nigeria's artisanal fisheries (Chukwu and Ejirooghen, 2020). Within the super family Penaeoidea, the largest family is Penaeidae. Penaeidae is a family of marine crustaceans in the suborder Dendrobranchiata, sometimes referred to as penaeid shrimp or penaeid prawn. It includes numerous economically significant species, such as the freshwater Penaeids. In the marine environments, the tiger prawns (*Penaeus monodon*). Penaeids comprise the widely distributed Fenneropenaeus prawns, which are found in tropical and subtropical regions. (Richmond, 2002)

Understanding the food and feeding patterns of marine species is important for understanding their rate of development, population density, gonad maturation, and other metabolic processes. In the specific habitat where these species live, they also aid in the formation of connections in the food chain and the predator-prey relationship, several significant insights into the diet and feeding behaviours of prawns (Ipinmoroti *et al.*, 2008).

This study is aimed at providing relevant data on the feeding behaviour of *Penaeus notialis* with the view of practical applications of such knowledge for aquacultural purpose so as to increase the production of the shrimp under captivity, just like the Giant prawn (*Macrobrachium rosenbergii*) is heavily cultured (Soundarapandian et al., 2008; El-Sherif and Ali., 2009)

MATERIALS AND METHODS

The study was carried out in Abonnema Creek Rivers State, Nigeria, The creek is brackish and supports a diverse range of aquatic life, including fish, crabs, shrimps, and various aquatic plants like nypa palm (*Nypa fructican*). It is located at latitude and longitude 04.51'N and 07.01'E respectively.

Samples of *Penaeus notialis* were obtained every two weeks for a period of three months in clean plastic buckets from random selected fishermen around Abonnema Creek. The samples were preserved in 10% formaldehyde solution at the point of collection and immediately transferred to the laboratory analysis.

Stomach content was analyzed using the following methods:

Number (numeric) method:

The number method is based on the counts of food items in the gut content. It is expressed as:

Percentage by number (%N) = $\frac{\text{Total Number of the particular food item}}{\text{Total number of all food items}} \times 100$ (Ezenwaji and Offiah, 2003; Chukwu and Deekae 2013)

Frequency of Occurrence Method

Frequency of occurrence of each diet expressed as:

% Occurrence of the food item = $\frac{\text{Total Number of stomachs with the particular food item}}{\text{Total number of stomachs with food}} \times 100$ (Ezenwaji and Offiah,

2003; Chukwu and Princewill, 2019)

Index of Food Significance (IFS)

$IFS = \frac{\%F \times \%N}{\sum \%F \times \%N} \times 100$ (Ezenwaji and Offiah, 2003; Chukwu and Ejirooghen, 2020) Where,

IFS= Index of Food Significance

%F= Percentage frequency of occurrence of food item.

%P= Percentage Number of food item.

Food with $IFS \geq 3\%$ will be regarded as primary, ≥ 0.1 to $<3\%$ as secondary, whereas, food with $<0.1\%$ will be regarded as incidental (Vandi *et al.*, 2019).

RESULTS

The stomach content of *Penaeus notialis* from Abonnema Creek (n= 210) examined, showed that three families of algae; (Bacillariophyceae, Cyanophyceae and Chlorophyceae), were present. Seven genera (*Melosira*, *Cyclotella*, *Diatoma*, *Anabaena*, *Spirulina*, *Raphidopsis* and *Cladophora*), and nine species of algae (*Melosiravarians*, *Melosriadistans*, *Cyclotella atomia*, *Cyclotella glomerata*, *Diatoma elongatus*, *Anabenaspiriodes*, *Spirulina* sp, *Raphidiopsis curvata* and *Cladophora* sp.) were observed (Table 1).

There were no empty stomachs among the samples studied

Table 1: Stomach content of *Penaeus notialis*

Food Item (Algae species)	N	%N	F	%F	IFS	%IFS
Bacillanophyceae						
<i>Melosira varians</i>	43	4.63	12	10.53	48.75	4.10
<i>Melosira distans</i>	66	7.10	12	10.53	74.76	6.28
<i>Cyclotella atomia</i>	387	41.66	15	13.16	548.25	46.09
<i>Cyclotella glomerata</i>	78	8.40	13	11.40	95.76	8.05
<i>Diatoma elongatus</i>	53	5.71	11	9.65	55.10	4.63
Cyanophyceae						
<i>Anabaena spiriodes</i>	40	4.31	11	9.65	41.59	3.50
<i>Spirulina</i> sp	177	19.05	13	11.40	217.17	18.26
<i>Raphidiopsis curvata</i>	41	4.41	14	12.28	54.15	4.55
Chlorophyceae						
<i>Cladophora</i> sp	44	4.74	13	11.40	54.04	4.54

DISCUSSION

The results of the study differ slightly from that of Oluboba (2015) that reported that *P notialis* fed on crustaceans, diatoms, filament algae including plant materials.

The most important food item for the species (*Cyclotella atomia*) recorded the highest value for percentage numerical value (41.66) and frequency of occurrence (13.16). While the least important food item (*Anabaena spiriodes*) presented the lowest numerical value and a joint lowest frequency of occurrence (9.65) with *Diatoma elongatus*. Oluboba (2015) reported some degree of variation in the stomach content of *Penaeus notialis* and *Penaeus monodon*. The study listed the stomach content of the shrimps to include phytoplankton, crustacean, as well as diatoms, filament algae, debris and sand. The food consumed by organisms could be influenced by several factors such as availability, physiological state of the organism environmental conditions and a host of other factors like predation. An accurate depiction of fish diets and feeding behaviors serves as the foundation for comprehending trophic relationships in aquatic food webs. Fish trophic relations are conceptually based on diet and feeding patterns. Gut content analysis can be used to assess prey selection, habitat preferences, ontogeny effects, and the development of conservation approaches (Chipps & Garvey 2007).

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