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Growth and foods of the Bigfisted Swim Crab (*Callinectes latimanus*) from Abonnema Creek, Rivers State, Nigeria

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Abstract
A study on the growth and food of Callinectes latimanus from Abonnema creek, Rivers State, Nigeria was carried out for a period of three months (May to July 2023) using standard methods. Regression analysis of length-weight revealed that the fish growth was allometric (2.1241±0.084), Fulton's condition factor for the fish was 1.472767±0.158136. Frequency of occurrence and points method were used to examine the gut contents, Index of food significance for the species showed that algae was the most preferred food item (37.27%), Other food items found the stomach of the fish were shrimp (tissue and shell) 16,39%, polychaetes 15.53%, other crustaceans found in the gut constituted 8.97% of the food consumed. Gastropods (tissue and shell) was 8.45%, sediment grains 5.17%, pieces (tissue, bone, fins and spine) contributed 3.10% of food ingested while bivalve (tissue and shell) added 1.01% . The food preference of the Bigfisted swim crab in Abonnema Creek indicated that it is an omnivore and would required compounded food made from both animal and plant sources if reared in captivity.

Key words; *Crustaceans, feeding, length, weight, food.*

Introduction

The African Bigfisted Swim crab (*Callenectes latimanus*): This species is distinguished by its less raised inner branchial and cardiac areolets. The Mediterranean Sea, the Middle East, and the coasts of Africa are home to it naturally. Its caraspace, the enormous shell that encloses its body, can measure up to 13 centimeters in width, making it a relatively large creature. As omnivores, they consume plants and animals, usually small fish, crabs, and mollusks (Ekpo et al., (2016).

The process of fish growth is known as an integrative physiological response, involving both internal physiological status (health, stress, and reproductive state) and external environmental factors (amount and quality of food, temperature, and water quality) (NOAA, 2023). As more flesh is added as a result of protein synthesis, it is the expansion or increase in various organs and tissues of the organism with respect to time. Growth therefore; requires a rise over time in the size of the organs and the length/height and weight of the body (NOAA, 2023).

Any item that is consumed and has the ability to be broken down, absorbed, and used to produce energy is considered food. Various classes of organisms have a variety of resources that are suitable for use as food. The main components of food are roughage, vitamins, minerals, carbonhydrates, protein, and fat and oil. Food is the primary energy source for most organisms, enabling them to move about in search of food, avoid predators, and migrate in the case of migratory species. It is the primary energy source for growth, respiration, excretion, and the removal of other kinds of wastes. It is also necessary for reproduction and the survival of species. (Ovie & Ovie, 2014).

The possibility of rearing this organism under captivity is high. Therefore; it becomes imperative that necessary data for its growth and food preferences be made available for such endeavors to be successful.

Materials and Methods

The Study was carried out in Abonnema Creek in Rivers State, Nigeria. Abonnema creek is located at latitude 04.51'N, and longitude 07.01'E in Rivers State. The creek is a brackish water environment which is along the Sobreiro River of Rivers State having numerous intertidal flats and mangrove vegetation. Over the course of three months, fishermen along Abonnema Creek provided random samples of *Callinectes latimanus*. After that, they were placed in plastic containers with a 10% formaldehyde solution and sent to the lab for examination.

The following techniques were used to evaluate the samples:
The following formula was used to find the growth coefficients for the length/weight data:
$W=aL^b$ regression ----------(1) Where,
W= Weight of the Fish (grams)
a= Intercept of the regression
L= Total length (cm)
b= (Fish Growth coefficient)
The condition factor (K) was estimated using the following relationship:

$$K = \frac{100W}{L^3}$$

(Chukwu and Pepple 2021).
Where:
W= Weight (grams)
L= Observed Total length (cm)
K= Condition Factor
The following techniques were used to evaluate the stomach content:
Points method:
Points were awarded to various food items based on their quantity (size) in relation to the other, this was expressed as follows:

$$\text{Percentage by number (\%N)} = \frac{\text{Total Points of the particular food item}}{\text{Total Points of all food items}} \times 100$$

(Ezenwaji and Offiah, 2003)
Frequency of Occurrence Method

Frequency of occurrence of each diet was expressed as:

$$\% \text{ Occurence of the food item} = \frac{\text{Total Number of stomachs with the particular food item}}{\text{Total number of stomachs with food}} \times 100$$

(Ezenwaji and Offiah, 2003;)

Index of Food Significance (IFS)

$$IFS = \frac{\%F \times \%P}{\sum \%F \times \%P} \times 100$$

(Ezenwaji and Offiah, 2003; Chukwu and Nwala 2021) Where,

IFS= Index of Food Significance

%F= Percentage frequency of occurrence of food item.

%P= Percentage Number of food item.

RESULTS

Length/weight data analysis for *Callinectes latimanus* (n = 210) indicated a negative allometric growth (2.1241±0.084) for the crab. The relationship between length/weight, length/width and weight/width presented a high R square value (Table 1).

Table 1. Growth Parameters for *Calinectes latimanus* from Abonnema Creek

SN	Parameter	Length/Weight	Length/Width	Weight/Width
1	b	2.1241±0.084	1.0456±0.0334	0.3947±0.0176
2	a	0.1639±0.0683	0.1928±0.0269	0.2938±0.0330
3	R^2	0.7505	0.8248	0.7067

The monthly condition factor had its peak in May and the lowest point in June (Figure 1), while the mean condition factor for the fish was 1.472767±0.158136.

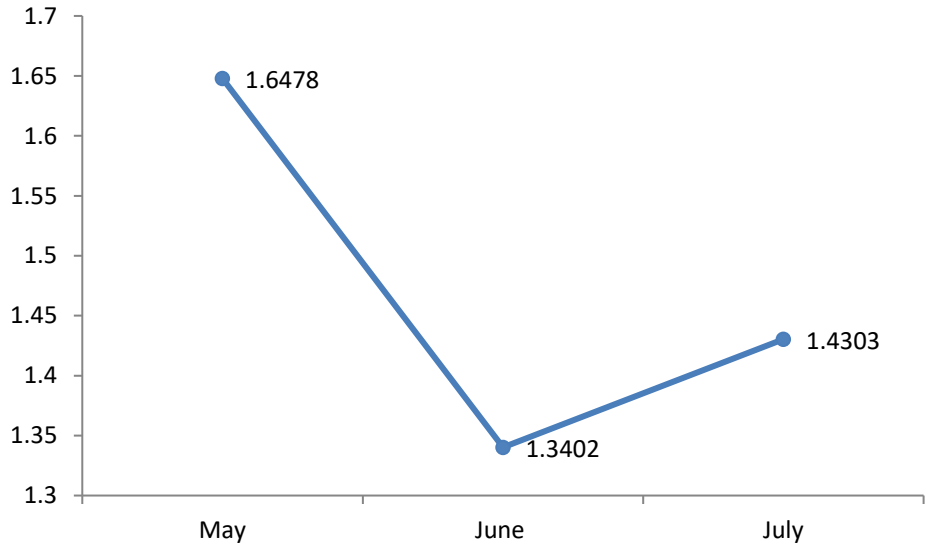

Fig. 1. Monthly Condition Factor of *Callinectes latimanus* from Abonnema Creek

Food items seen in the stomach of the crab were Annelids (polychaete tissues), Mollusks (bivalve and gastropod tissues/shells), Pisces (fish tissues/bones/fins/spines), other animal tissue were (crustacean and shrimp tissue/shell), Plant (Algae) and sediment grains. The most important food item for the crab (the most consumed) was algae which had a percentage IFS of 37.27, while the least consumed was bivalve tissue and shell (Table 2).

Table 2. Stomach Content of *Callinectis latimanus* from Abonnema Creek

S/N	Food Item	F	%F	P	%P	IFS	%IFS
	Annelids;						
	Polychaetes (tissue)	10	13.70	18	16.67	228.38	15.53
	Mollusks;						
	Bivalve (tissue/shell)	3	4.11	4	3.70	15.21	1.03
	Gastropods (tissue/shell)	7	9.59	14	12.96	124.29	8.45
	Pisces;						
	Fish (tissue/bone/fins/spine)	4	5.48	9	8.33	45.65	3.10
	Other Animal Tissue;						
	Crustaceans	8	10.96	13	12.04	131.96	8.97
	Shrimp (tissue/shell)	10	13.70	19	17.59	240.98	16.39
	Plant;						
	Algae	16	21.92	27	25.00	548	37.27
	Sediments grains	15	20.55	4	3.70	76.04	5.17

DISSCUSSION

The bigfisted swim crab *Callinectes latimanus* had a negative allometric growth (2.1241±0.084), a length/width coefficient of 1.0456±0.0334 and a weight/width coefficient of 0.3947±0.0176. The implication of the allometric growth is that the crab gets slimmer as it increases in weight, in other words it increases faster in length than weight. These findings are similar to those of Ezekiel and Edah (2014), as well as Lawal (2006).

The gut content of *Callinectes latimanus* depicts that of an omnivore, Comprising of plant and animal tissues). Although the most important item was algae (37.27%), animal tissues such as shrimp (tissue and shell) constituted 16,39% and polychaetes (tissue) was 15.23%, this is indicative of an organism that feeds from the bottom of the water column. These findings are in conformity with those of Warner (1977), Kusemiju (1998) as well as Chukwu and Princewill, (2019).

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