STUDIES ON BIOLOGY OF PERCH *CHANDA NAMA* (HAMILTON 1822) FROM THANA BOOLA KHAN, SINDH, PAKISTAN

AMBREEN KHOSO[1], WAZIR ALI BALOCH[2], GHULAM SARWAR GACHAL[1], ANILA NAZ SOOMRO[2], BISHARAT UL RASOOL KHOSO[2], SHAGUFTA SADDOZAI[3], YOUSRA ZULFIQAR[1] AND MARYAM MANGI[1]

[1]Department of Zoology University of Sindh
[2]Department of Freshwater Biology and Fisheries University of Sindh
[3]Sardar Bahadur Khan Women's University Quetta

خلاصہ

یہ مطالعہ دائوڈیم، تھانابولا خان سندھ، پاکستان، میں پائی جانی والی چھوٹی سی مقامی مچھلی ''چندانما'' کے حوالے سے ''تعلق مابین لمبائی و وزن''، تعلق مابین لمبائی لمبائی'' ''جسمانی وزن ولمبائی اور ماحول کی باہمی اثر پذیری کے حوالے سے عمومی صحت'' اور اس کی خوراک کے مطالعے پر مشتمل ہے۔اس مطالعے کے لیے فروری ۲۰۱۵ سے جولائی ۲۰۱۵ تک ماہانہ بنیادوں پر کل ۱۳۹ نمونے (نر ۷۳، مادہ ۶۶) حاصل کیے گئے۔ ہر نمونے کی معیاری لمبائی اور کل لمبائی کی پیمائش پیمائش بورڈ کے ذریعے کی گئی اور جسمانی وزن ڈیجیٹل میزان کے ذریعے کیا گیا۔ نر، مادہ اور چندانما کی کل آبادی میں ''تعلق مابین لمبائی و وزن'' نے منفی الومیٹرک نشوونما کو ظاہر کیا جبکہ ''تعلق مابین لمبائی لمبائی'' نہایت باہم مربوط تھے۔''جسمانی وزن ولمبائی اور ماحول کی باہمی اثر پذیری کے حوالے سے عمومی صحت'' کا تناسب نر آبادی میں ۱۲۱۔۱، ۰۶۵، مادہ میں ۱۲۴۔۱، ۲۰۴۔۰، اور مخلوط آبادی میں ۱۲۲۔۱، ۰۴۴۸ پایا گیا جو مچھلی کی خوشحالی بہتری یا بہتر نشونما (ان تینوں الفاظ میں سے کسی ایک مناسب لفظ کا انتخاب کیا جائے) کا اظہار تھا۔ یہ مچھلی گوشت خور ہے اسے چھلکے خور لیپیڈوفیگس بھی کہا جاتا ہے۔ چندانما کی خوراک مچھلی کا گوشت چھلکے کانٹے، حشرات اور چھوٹے چھوٹے آبی جانور ہیں۔

(۱) ہماری معلومات کے مطابق یہ مطالعہ ''چندانما'' کے حوالے سے ''تعلق مابین لمبائی و وزن''، تعلق مابین لمبائی لمبائی'' ''جسمانی وزن ولمبائی اور ماحول کی باہمی اثر پذیری کے حوالے سے عمومی صحت'' اور اس کی خوراک کے بارے میں پاکستان سے پیش کیا جانے والا اولین مطالعہ ہے۔

(۲) ہماری معلومات کے مطابق کے اپنے موضوع کے اعتبار سے یہ پاکستان سے پیش کیا جانے والا اولین مطالعہ ہے

Abstract

Length-weight relationship (LWR), length- length relationship (LLR), relative condition factor and feeding of a small indigenous fish *Chanda nama* from Dau Dam Thana Boola Khan, Sindh, Pakistan are reported. A total number of 139 specimens (73 male and 66 female) were caught for this study on monthly basis from February 2015 to July 2015. Total length and standard length for each specimen were measured by measuring board and body weight (BW) of each specimen was taken by a digital balance. In male, female and total population of *Chanda nama* the body coefficient (*b*) of the LWRs indicated negative allomertic growth while LLRs were highly correlated. The value of Condition Factor was 1.21± 0.65 in male population, 1.34±0.204 in female and 1.22±0.448 in mix population which indicate the well being of fish. The fish is highly carnivorous by nature and also considered as lepidophagous (scale eater). The food of *Chanda nama* contained fish meat, scales, spines, insects and zooplankton.

Introduction

Chanda nama (Hamilton) commonly known as elongate Glass Perchlet while locally this fish is called as Sheesha Machli. It is a freshwater perch and a member of family Ambassidae and order Perciformes. According to Talwar and Jhingran (1991) the fish is mostly found in different water bodies of Pakistan, India, Bangladesh and Nepal. *Chanda nama* is found in freshwater and brackish water, inhabiting running and standing waters. It is a nocturnal or crepuscular fish famous for lepidophagy or scale eating (Gruh and Winemiller, 2004). According to Talwar and Jhingran (1991) and Daniels (2002) *Chanda nama* has minor fishery importance in India and in Bangladesh Mazumder *et al.*, (2008). This fish is non commercial and being sold with other small fishes at low price in India and Bangladesh (Talwar and Jhingran, 1991, Daniels, 2002). In Pakistan no commercial fishing of this fish is seen and it is considered low priced fish. This fish is effective feeder on copepods which cause guinea worm disease therefore, it can be useful in controlling this disease (Talwar and Jhingran, 1991; Chandra *et al.*, 2008). The *Chanda nama* has become gradually endangered fish (IUCN. 2010).

Chanda nama has been reported mostly having 11 cm in maximum length (Menon, 1999). It is famous for aquarium purpose and got high market importance as ornamental fish (Gupta and Banerjee, 2008, 2012). In Pakistan there is no information so far available on length-weight (LWR), length-length (LLR) relationship, Condition factor and Food Feeding of *Chanda nama.*

Materials and Methods

The fish samples for present study were taken from Dau Dam near Thana Boola Khan city. The fish samples were collected on monthly basis from February 2015 to July 2015. These were immediately preserved with ice at the landing centre and fixed in 5% formalin on arrival at the laboratory. For each individual, total length (TL) and standard length (SL) were measured to the nearest 0.1 cm using digital slide caliper and whole body weight (BW) was taken on a digital balance with 0.1 sensitivity. The weight-length relationships were calculated using the Le Cren (1951) expression: $W = aL^b$, where W is the body weight (g) and L is the total length (mm). Parameters *a* and *b* were estimated by linear regression analysis based on natural logarithms using the following equation.

$$\ln (W) = \ln a + b \ln (L)$$

The coefficient of determination r^2 was also estimated to make the relationships between BW vs SL and TL vs SL by linear regressions. The weight of fish and stomachs were taken using digital electronic balance. Before weighing, all fish were dried using paper towels and weight was taken with a sensitivity of 0.1 g. The measurement of food feeding is taken by using the following equation as suggested by Hynes (1950), where "P" indicates the percentage of occurrence of each food item.

$$P = \frac{\text{No.of fish containing particular food item}}{\text{Total number of fish examined with food in gut}} \times 100$$

A binocular dissecting microscope (Kyowa, Japan) was used for food content analysis. The food items were identified in different groups.

Results

Length- weight relationship

The male - female ratio was estimated as 1.1:1.0. The size range during present study was 2.5- 9.8 cm in male whereas in female was 2.4 – 10.2 cm while in Combine population 2.4 – 10.2 cm. The SL (Standard Length) of female range was observed 2.1-8.1 cm, while in male it was observed 1.9-8.9 cm. The LWR and LLR is descriptive statistics on the length and weight measurements, sample sizes *n*, regression parameters *a* and *b* of the LWR, LLR and coefficients of determination r^2 of the of small species *Chanda nama* (Tables 1 and 2). The observed maximum TL was 10.2 cm in females while in male the maximum TL was 8.6 cm. The regression coefficients *b* values ranged from 2.0462 in male while 2.5054 in female populations and 2.138 in combined population of *Chanda nama*. The value of coefficient of determination (r^2) for male population was 0.86, for female 0.926 and 0.828 for combine population (Fig. 1). While in LLR the values of *b* were 1.089 for male, 1.032 for female and 1.065 for combine population, and coefficient of determination (r^2) was 0.961 for male, 0.965 for female and 0.961 for combine population (Fig. 2).

Condition Factor

The value of condition factor was 1.21± 0.65 for male population, whereas in female 1.34±0.204 and 1.22 ± 0.448 were seen in mix population.

Food feeding

The Stomach contents shows variety of food items. These included scales, spines insects, fish, zooplankton and semi digested food (in the form of paste) (Figs. 3 and 4). During the study of food feeding it was observed that the uptake of food was higher in the months of February, March, June and July, whereas in April and May the amount of food was comparatively less (Fig. 5). The fish meat was also commonly present in the gut. This fish is famous for Lepidophagy that refers to its scale eating nature (Table 3).

Discussion

The length-weight studies revealed that all male and female fish population showed the negative allometry, where the value of *b* for male was 2.046 while female 2.505 and combine population being 2.138. All these

values are less than 3.0. Various studies from Indian water bodies also show negative allometric growth. Sarkar *et. al.,* (2013) reported the values of *b* and coefficient of determination from Indian rivers Ganga, Gomti and Rapti. He studied 70 specimens of *Chanda nama* from Ganga River where length range was 2.8 -9.1 cm whereas in Gomti River there were 80 specimens and length range was recorded 3.0-8.7cm while from Rapti River there were 22 specimens recorded and size range was 3.2-8.7 cm and the Values of *b* were 1.54 (Ganga), 1.93 (Gomti) and 1.71 (Rapti) whereas the coefficient of determination (r^2) was 0.94, 0.93 and 0.92. In Bangladesh on the other hand, Hossain (2012) studied 159 specimens of *Chanda nama* ranged from 3.33-6.44cm and value of *b* was 2.79 and coefficient of determination was 0.952. In the present study we studied 139 specimen of *Chanda nama* we observed a length range 2.4-10.2 cm, and the value of *b* was observed 2.138 and the coefficient of determination was 0.828. Our results are in agreement with the work done by Sarkar *et. al.,* (2013*)* and Hossain (2012); the value of *b* in both sexes shows the negative allometric growth. The LLR relationship on the other hand, was observed 1.9-8.9cm in male, 2.1-8.1 cm in female and 2.1-8.1 cm combine population.

The size range in our study shows higher length as compared to Sarkar *et. al.* (2013) and Hossain (2012), where size range from India was 2.8-9.1 cm and in Bangladesh it was 3.33-6.44 cm whereas in present study it was 2.4-10.2 cm.

LLRs showed the value of *b* were 1.089 for male and female 1.032 while for combine population it was 1.065. The coefficient of determination was 0.961 for male 0.965 for female and 0.961 combine populations. The value of *b* less than 3.0 normally it indicates poor growth of fish in that environment. It is also observed that most of the smaller fish which show different relationship between length and weight show the *b* value less than 3.0. In our study the second opinion seems to be appropriate because our data includes very small and larger fish as compared to other researchers. The availability of larger size of fish indicates suitable habitat for the fish in the present study. In present study the value of Condition Factor is 1.21± 0.65 in male population, whereas in female 1.34±0.20 and 1.22±0.448 in mix population.

The value of condition factor reported by Hossain (2012) and Manjural (2014) are 1.41±0.19 and 0.95.

As compared to Hossain (2012) and Manjural (2014) our values are little less which indicates that the environment of the fish here is less suitable for the fish. Different feeding habits of *Chanda nama* is reported by different Researchers like Job (1941) reported that *Chanda nama* is zooplankton feeder also prefer the insects, Hora and Mukerji (1953) reported its larvivorous nature, It is a carnivorous in nature, insect parts, fish scales and pieces of higher plant are the parts of its diets reported by Natarajan *et al.*, (1975) but on the other hand Roberts (1989) has suggested its lepidophagus nature which later was been supported by Grubh *et al.,* (2004). Similar findings were seen in present studies the *Chnada nama* is lapidophaghy in nature.

Table 1. Descriptive statistics and Regression parameters of length-weight relationships of male (M), Female (F) and combine population.

Sex	No	Total Length (cm)		Regression Parameters		
		Min	Max	*a*	*b*	r^2
Male	73	2.5	9.8	0.056	2.046	0.860
Female	66	2.4	10.2	0.031	2.505	0.926
Combine	139	2.4	10.2	0.037	2.138	0.828

Table 2. Descriptive statistics and Regression parameters of length-length relationships of male (M), Female (F) and combine population.

Sex	No	Total Length (cm)		Regression Parameters		
		Min	Max	*a*	*b*	r^2
Male	73	2.5	9.8	0.423	1.089	0.961
Female	66	2.4	10.2	0.519	1.032	0.965
Combine	139	2.4	10.2	0.465	1.065	0.961

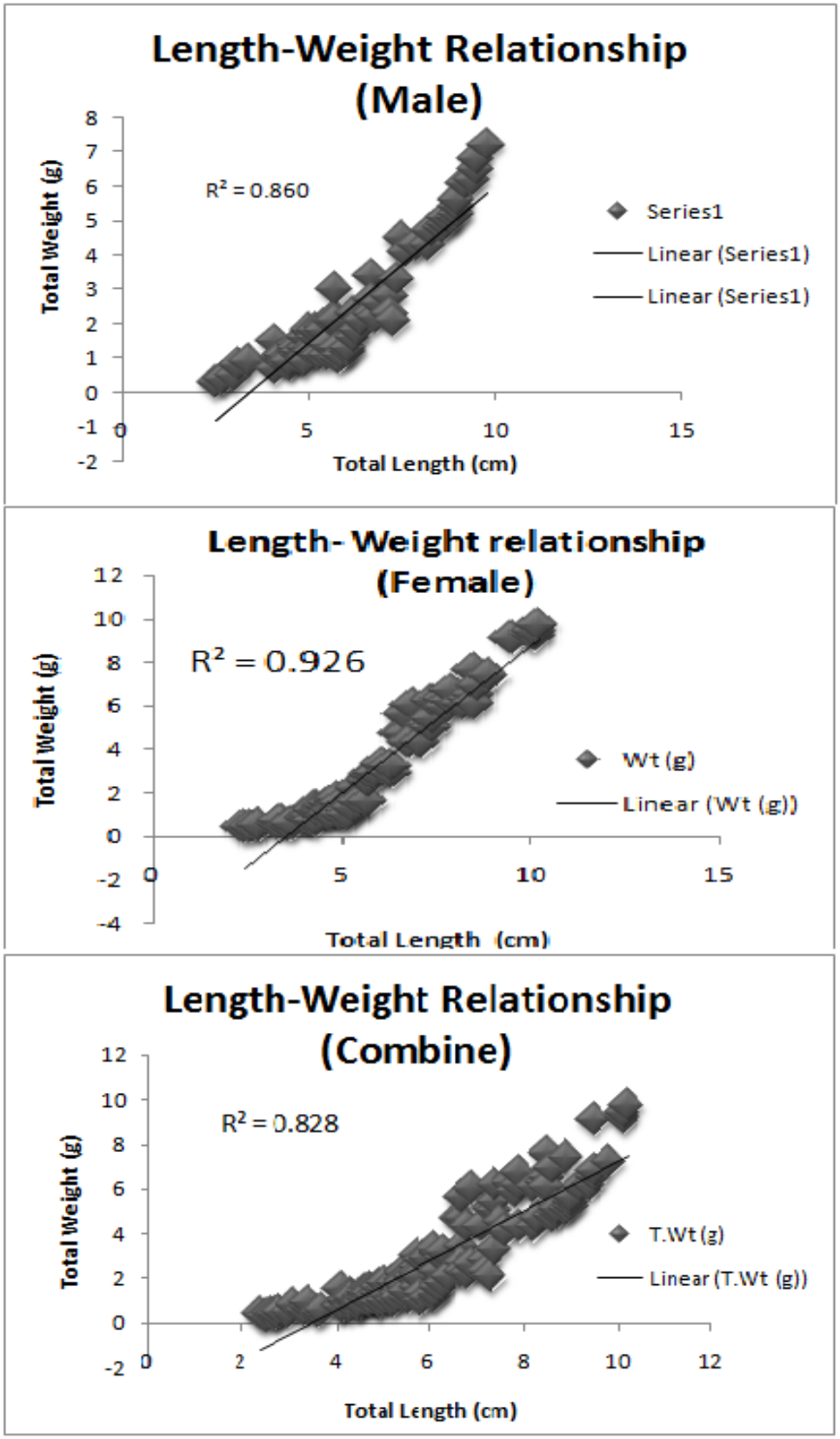

Fig.1. The co-efficent of determination between length and weight *C.nama*.

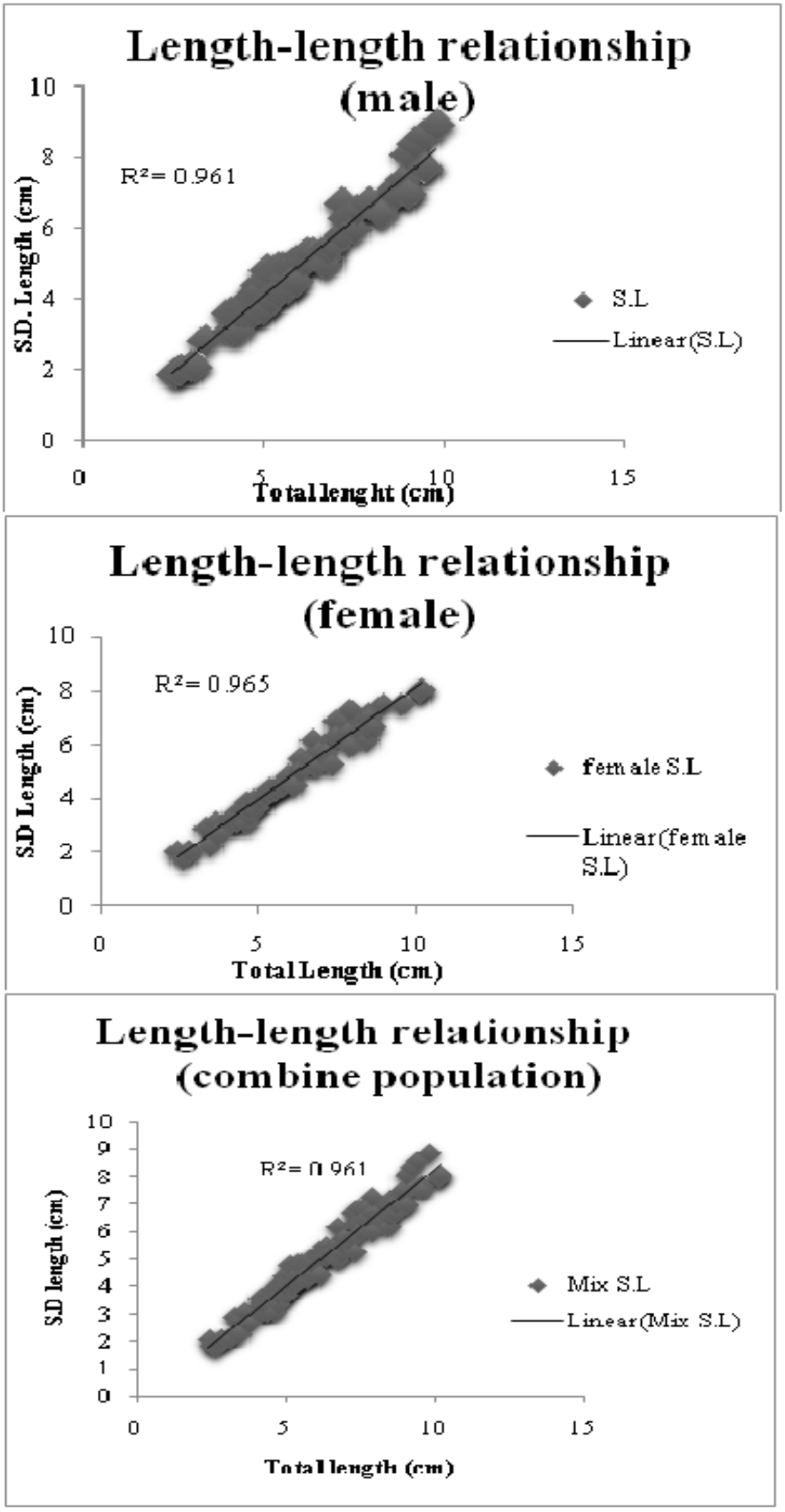

Fig.2. The co-efficient of determination between length and length of *C. nama*.

Table 3. The monthly variation in composition of food items of *Chanda nama.*

Months	Total fishes examined	Digested Food	Fish meat	Scales/Spines	Zooplankton
February	32	61.02	21.32	14.11	0
March	23	63.26	9.78	24.78	0
April	18	40.27	15.83	41.11	2.77
May	16	49.70	24.11	26.17	0
June	20	82.14	11.90	2.38	3.57
July	17	59.46	20.17	19.10	1.60

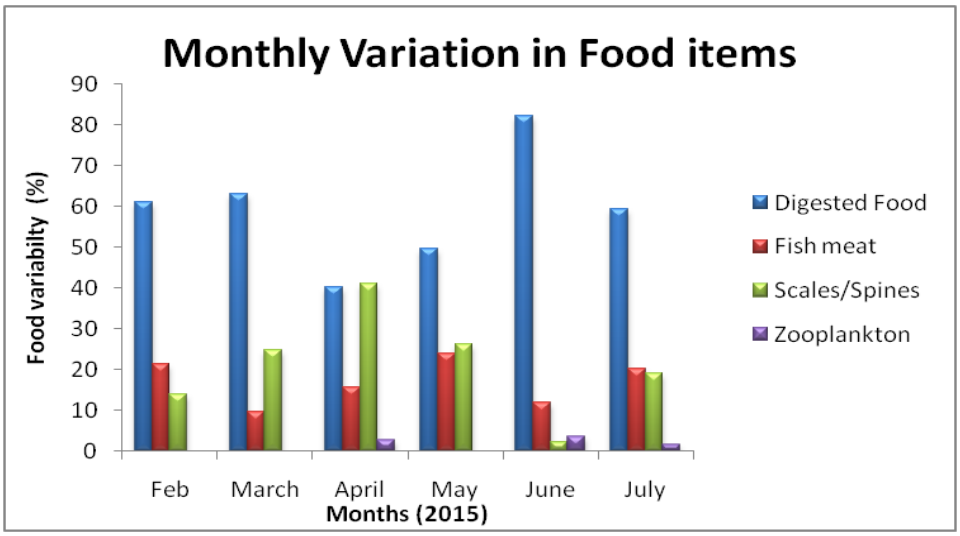

Fig.3 The monthly variation in composition of food items of *Chanda nama.*

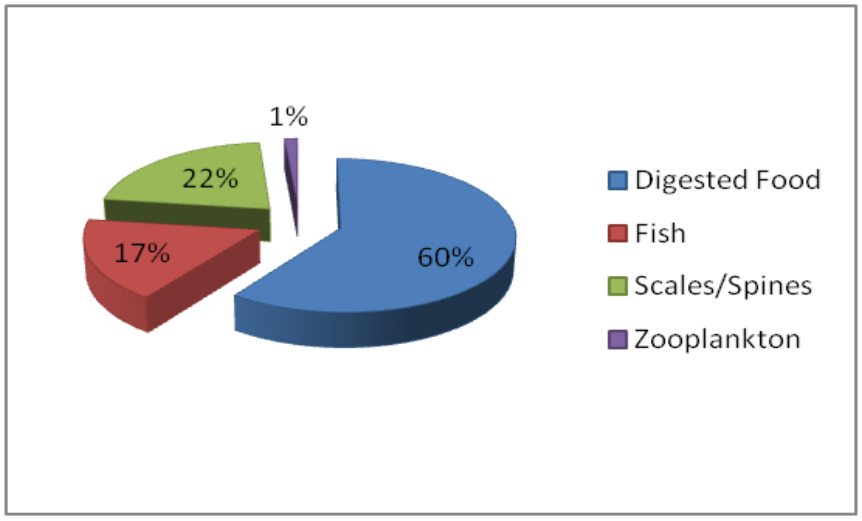

Fig.4. Percentage composition of food items found in the gut of *Chanda nama.*

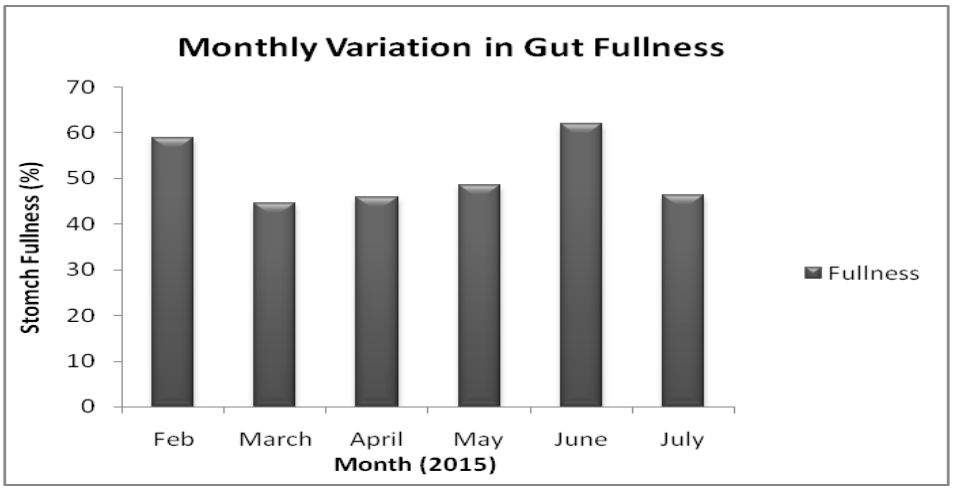

Fig.5. Monthly Variation in Gut Fullness.

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