RELATIONSHIP BETWEEN THE BASIC MORPHOMETRIC MEASUREMENTS AND GROWTH PATTERN OF *HETEROTIS NILOTICUS* FROM RIVER KADUNA FLOOD PLAIN

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ABSTRACT

61 specimens of heterotis niloticus were evaluated by linear regression and correlation. The specimens had mean standard length of 27.09 ± 4.73 cm, total length of 33 –49cm, mean weight of 244.5 ± 108.3g, mean snout length of 48± 0.86cm, mean eye diameter of 1.30± 0.15cm, mean head length of 6.29± 1.75cm. There was a strong relationship between the length and the weight, the eye diameter and the standard length, snout length and the standard length, head length and the standard length, snout length and the weight, head length and the weight (P<0.05). But the correlation of the eye diameters and the weight was Insignificant. (P>0.05). The growth pattern analysis depicts that the growth was negatively allometric with a,b value of 1.16.

INTRODUCTION

Materials and methods

A total of 61 specimens of Heterotis niloiticus of various sizes were obtained from the flood plains of river Kaduna between June – October 2001 a period of 20 weeks using gill nets, sampling was done once a month. Biometric measurements were taken and specimens were eviscerated.

The following morphemetric feature of the Heterotis niloticus (total length standard length, head measured with the aid of a measuring ruler, a mathematic, set divider, the weight of the fish was taken the length of girt and intensities where taken with gut was taken by using electrical sensitive balance the scale counting was done with aid of a divider.

Linear regression was employed to determine the type of relationship between any given pairs of variables and their linear equation. Correlation analysis was used to ascertain the significance of these relationship. A derivative of length weight study is the ponderal index denoted as

K $K = {}^{w}/_{L^3} \times \frac{100}{1}$

Where w = weight (g) L = standard length (cm)

Results

Basic Biometric of Heterotis Nilotieus

The result of the biometrics of Heterotia nilotiens specimens examined provides the following information the standard length of this specimen ranged from 21-45cm with a corresponding body weight ranging from 90-900g

Morphometric Measurement Heterotis Niloticus

The result of the morphometric measurement of Heterotis niloticus specimen examined provides the following information. The south length ranged from 42-8.4cm with a mean standard deviation of $\bar{x} = 1.30 \pm 0.15$ while the head length ranges between 4-9cm with a mean deviation of 6.29 ± 1.75.

Table 1
RANGE AND THE MEAN STANDARD DEVIATION OF THE BIOMETRICS MEASUREMENTS

Measurement	Range (cm)	Mean Standard Deviation
Snout length	4.2-8.4	48 ± 0.86
Eye diameter	1 - 1.7	1.30 +'0.15
Head length	4-9	6. 29 ±1.75
Standard length	21 -45	27. 09 ±4. 73
Weight	90 - 900	244. 5 ±108. 3
Body depth	2.4-5.6	5.42 + 2.25
Body girth	5-7.5 '"	6.17 + 0.95

RELATIONSHIP BETWEEN THE MORPHOMETRIC MEASUREMENTS STANDARD LENGTH – EYE DIAMETER RELATIONSHIP

Eye diameter was regressed against standard length as shown in fig 1. it was observed that there was a very strong positive interrelationship between the eye diameter and the standard length as correlation co-efficient r was 0.26 and significant (P<0.005) increase in length was associated with increase in eye diameter.

STANDARD LENGTH –SNOUT LENGTH RELATIONSHIP

Snout length was regressed against the standard length as shown fig 2 it was observed that there was a relationship between the snout length and the standard length as correlation co-efficient was 0.07 and significance (P<0.05). increase / or length was associated with increase in head length.

WEIGHT SNOUT LENGTH RELATIONSHIP

The snout length was regressed against the weight is shown in fig 4. It was observed that there was a strong relationship between the snouts length and the weight as correlation. Co-efficient r was 0.64 and was significant (P< 0.05) increase in weight was associated with an increase in snout length.

WEIGHT - HEAD LENGTH RELATIONSHIP

The head length was regressed against the weight as show in fig 5 it was observed that there was a strong positive relationship between the head length and the weight. Correlation co-efficient r was 0.1 and was significant (P<0.05).

WEIGHT – EYE DIAMETER RELATIONSHIP

Eye diameter was regressed against the weight as shown in fig 6. it was observed that there was no relationship between the eye diameter and the weight correlation co-efficient r was 0.01 hence in significant (P<0.05)

LENGTH – WEIGHT RELATIONSHIP AND GROWTH PATTERN OF HETEROTIS NILOTICUS

The condition and growth of the fish were derived from the length and weight measurement of the specimens. Log weight was regressed against log length as shown in table 2

Growth in fish is exponential as described by equation $Y = ax^b$ (Huxley 1933 and written 1992). Linearised as $\log U = \log_a + \log_x$ (Le cren, 1951) It was observed that the growth of Heterotis niloticus was negatively allometric with b value 1.16 (Ricker 1970). There was a very strong interrelationship between the length condition factor otherwise called ponderal index denoted as 'k' is the measure of fish condition, which reflects physiological condition of the fish. It is represented by the equation

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

Table 2

Showing the range and mean standard deviation, coefficient of variation of the weight, standard length and the condition factor (K) of Heterotis niloticus.

	Range	M±SD	Coefficient of Variation
Standard length (cm)	21 -25	27. 09 ±4. 73	17.46
Weight (g)	90-90	244. 5 ±108. 3	44.29
Condition factor (k)	0.11 -2.75	1.15 ±0.47	40.87

DISCUSSION

From the result of the basic morphometric measurement of the 61 Heterotis niloticus specimens examined, it was observed that the fish must have the ability to grow big, hence can be a fast growing fish. A broad spectrum of the fish sizes was examined as evident in the significant, co-efficient variation of the standard length, weight and condition factor table.

Data analysis of the length – weight relationship gave useful information concerning the growth and body physiology of the fish. Growth was described as the change in the absolute weight (energy content) or length of fish over time (Wooten 1992). While Sadiku (1991) summarized growth as a function of fish size. Wootten (1992) reported that fish grow in length as well in bulk. Linear re regression of log standard length and log weight gave useful co-efficient of regression "b" is 3.0 is isometric below this is negative allometric and above it is only positive. The growth of Heterotis Niloticus of River Kaduna flood plains is negatively allometric with "b" value of 1.16 this means that the length growth weight is faster than body weight growth rate.

Biometric analysis of body parts shows the following, eye diameter regressed against the standard length gave a positively linear correlation. This means that for an increase in length, there was also an increase in the eye diameter. When the snout length was regressed against the standard length, there was a strong positive correlation. This correlation was significant hence, it was observed that an increase in the length of the fish also leads to an increase. In the snout length the head length also showed a strong positive correlation when regressed against the standard length. Hence an increase in the length was associated with the increase with head length from the above analysis it can be said that for any increase in size could be associated to all part of the fish. This agrees with the theory of proportionality of growth state of the organism.

The above statement cannot be said of the weight of the fish, the snout length gave a positive strong linear relationship between the snout length and the weight, this show that for any increase in weight there is also an increases in the snout length. The head length also show a strong positive relationship with the weight when regressed against the weight. This means that for increase in the weight of the fish the head length must also increase. When the eye diameter was regressed against the weight it was negative and in significant meaning that weight as no any relationship with the eye diameter.

Conclusion

In conclusion the study of the biometrics shows that there is a proportionate growth reflecting a good physiological growth of the fish. The growth of Heterotic niloticus of River Kaduna flood plain is negatively allometric, which is the normal growth pattern of the fish.

REFERENCES

Bakare 0. (1968). Food and feeding habitat of the Non-cichlid Fishes of the middle Niger with particular reference to Kainji Reservoir basin. Msc. Thesis University of Ife Nigeria pp. 150-195.

Bard, JP. de Kimpe, J. Hazard, J. Lemasson and P. lessent (1976) Handbook of Tropical. Fish Culture. Center Technique Forestier Tropical France Pg. 81.

Davies G.E. and Warren, C.E. (1971), Estimation of Food consumption rate in Ricker W.E. (Editor) Methods of Assessment of Fish Production in Freshwater (2nd edition). Black well, Oxford. Pp. 237-248.

Daget J. (1954) Les Possoin du Niger Superieur. I.F.A.N. Dakar (Mem I.F.A.N, 36)

Elliott, J.M. (1970) Dietary changes in invertebrates drifts and the food of trout. Salmo trutta(L) J. fish Biog 2. 161-165

E.G. Ita, 1986 Inland Fishery Resources of Nigeria F.O.A. Publication page 1-4

Holden M. and Reed, W. (1972), West Africa Freshwater Fish Longman Group Limited. Pp. 40-52. Imevbore A.M.A. and Bakare O. (1970). The food and feeding Habits of non-cichlid Fishes of the River Niger in Kainji Reservoir area. In: Kainji a man made lake Volume ecology (ed. S.A. Visser) Niger, Ibadan. Pp.49-64

Jackson P.BN (1971) the African great lake fisheries past present, and future Afr. J. trop. Hydrobiol. Fish 1:35-49 ;

Stephen, H.B. John T.W (1978) Method of study of Fish Diet Based on Analysis of Stomach contents in: Richer W.E. (ed). Methods of Assessment of Fish Production in Freshwater (3rd ed.) IBP Handbook No. 3. Pp. 219-226

Keast. A. and Weish L, (1968) Daily feeding periodicity food uptakes rate, and dietary changes with hour of the day in some lake fishes J. Fish Res. Bd. Can 25, 1133-1144 Kennedy C.R. (1960) Tubificid Oligocrraete as food of dace Leuciscus (L) Fish biology I, 11-15

Chakroff Marilyn (1978) Freshwater Fish Pond culture and Management: Action and peace crop program and training journal manual series No. 1.3 pg-139

Reed W. Buchard J. Hopsin, A.J. Jonathan J. and Yaro. I. (1967). Fish and Fisheries of Northern Nigeria. Gaskiya publication; Zaria to Nigeria Pg.

Sadiku; S.O.E. (2000) Feed formulation': A lecture delivered on Annual fisheries lectures in Federal College of Fresh water Fisheries, New Bussa

Sadiku; S.O.E. and Oladimeji A.A. (1991) Relationship of proximate of composition of Lates niloticus (L) Synodontis shall (Broch & Schneider) and Sarotherodon galilaeus (trewaues) from Zaria Dam. Nigeria. Bioscience Research Communications 3(1) :29-40.

Sagua V.O. (1978) Observation on the food and feeding Habit and reproduction biology of Gymnarchus niloticus From lake Chad. Lake Chad Research Institute University of Maiduguri Nigeria Pp. 179-185.

Turner (1970), The fish Pop's of the newly impounded Kanji lake F.A.O Rome FI.SF/NIR24Tech. Rep 1)

Welcomme, R.L. (1967) The biology and ecology of the fishes a small tropical stream J. Zool. London. 158; 485-529

Windell J.T. (1968) Food Analysis and weight of digestion method of studying food consumed In: Bagenal, T (ed) Fish Production in Freshwater (3rd ed) oxford pp. 197-201

Wootten , R.G. (1972), Tertiary Level Ecology: Fish Ecology Chapman and Hall, New York USA. Pp. 127-128.

Bard, JP. de Kimpe, J. Hazard, J. Lemasson and P. lessent (1976) Handbook of Tropical. Fish Culture. Center Technique Forestier Tropical France Pg. 81.

Davies G.E. and Warren, C.E. (1971), Estimation of Food consumption rate in Ricker W.E. (Editor) Methods of Assessment of Fish Production in Freshwater (2nd edition). Black well, Oxford. Pp. 237-248.

Stephen, H.B. John T.W (1978) Method of study of Fish Diet Based on Analysis of Stomach contents in: Richer W.E. (ed). Methods of Assessment of Fish Production in Freshwater (3rd ed.) IBP Handbook No. 3. Pp. 219-226

Reed W. Buchard J. Hopsin, A.J. Jonathan J. and Yaro. I. (1967). Fish and Fisheries of Northern Nigeria. Gaskiya publication; Zaria to Nigeria Pg.

Sagua V.O. (1978) Observation on the food and feeding Habit and reproduction biology of Gymnarchus niloticus From lake Chad. Lake Chad Research Institute University of Maiduguri Nigeria Pp. 179-185.

Windell J.T. (1968) Food Analysis and weight of digestion method of studying food consumed In: Bagenal, T (ed) Fish Production in Freshwater (3rd ed) oxford pp. 197-201