

## Length Weight relationship and Condition Factor of *Chanda nama* (Hamilton, 1822) and *Gudusia chapra* (Hamilton, 1822) from Brahmaputra River, Assam

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### ABSTRACT:

*Chanda nama* and *Gudusia chapra* both were economically and commercially important to the locals for consumption. Studying Length- Weight relationship and Condition factor of *Chanda nama* and *Gudusia chapra* serve a crucial role in maintaining the economically valuable product to the society and thus conserving it for aquaculture management. The study was performed by collecting it from the one landing site ie; Uzan Bazaar from Guwahati city, situated by the side of the river Brahmaputra, Assam. The study revealed that positive isometric growth was observed in the month of January and isometric growth observed in the month of November and February for the species *Chanda nama* with good condition factor. For the species *Gudusia chapra* isometric growth with good condition factor was observed in the month of November. Further, the present study is still lacking and required more sample for analysing the data in which future research needs to reflect.

### Keywords:

*Chanda nama*, *Gudusia chapra*, Length weight relationship, Condition factor, Assam.

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## INTRODUCTION

Length weight relationship is an essential parameter used in the calculation of length and weight of the fish necessary to assess their growth and to determine the fatness of the fish (Le Cren, 1951). It is also required to determine the size of maturity. (According to Bagenal & Tesch 1978; Tesch 1971; Ahamed *et al.*, 2014) Length weight relationship depends on ecological factors and other physiological parameters. This is due to the availability of food source, condition of climate or may be due to the sex's differences, maturity of gonad during breeding and also the health

condition of the fish. Condition factor which is established from Length Weight relationship is also essential an parameter for determining the well -being of fish in the area (Froese, 2006). These indices of length weight relationship and condition factor serve major tools for maintaining the fish population which is required in fishery sector (Ndiaye *et al.*, 2015).

*Chanda nama* (Hamilton, 1822), commonly known as "Asiatic Glass fish" or "Chanda" in Assamese, belongs to the family Abbasside and order Perciformes. It is diagnosed by its oval body shape with glass perch appearance and olive

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green colour. The fins of dorsal, anal, pectoral are spiny in appearance with caudal fin deeply forked, scales are very minute in size and dark spots are present on the dorsal fin part (Gupta, 2015). It is carnivorous and lepidophagus in nature consisting meat, zooplankton, insect and scales (Khosro *et al.*, 2018). *Chanda nama* is a valuable food fish and also provides a significant value in aquarium hobbyist since it is an ornamental glass fish (Gupta, 2015).

*Gudusia chapra* (Hamilton, 1822), commonly known as "Ganges Shad/ Indian River Shad" or "Chapla/Koroti" in Assamese dialect, belongs to the family Clupeidae and order Clupeiformes. It is diagnosed by its oblong shape body with blunt and short snout, with 26- 29 serrated scutes are present on the abdomen (Froese and Pauly, 2024) and its body is silvery white in appearance with black spot at the back of the gills dorsally (Vishwanath *et al.*, 2014; Arunachalam *et al.*, 2015). They feed on algae, crustacean, insects, protozoan and other plant materials (Phukan *et al.*, 2012) thus depicting its omnivorous in feeding habit. It is primarily used as food.

Various studies have reported the length weight relationship and condition factor of this two species by (Vinci *et al.*, 2005); (Ahmed *et al.*, 2007); (Ahamed *et al.*, 2014); (Sheikh *et al.*, 2017); (Khosro *et al.*, 2018); (Ahmed *et al.*, 2019); (Sangma *et al.*, 2019); (Ahmed *et al.*, 2021). From previous studies *Chanda nama* and *Gudusia chapra* have only been reported from other areas but particularly selected for studies from the Brahmaputra site of Assam only (Ahmed *et al.*, 2021). Thus the present study on the length weight relationship of these two species provides better knowledge in their management for economic activity and in conserving the species diversity in the area.

### OBJECTIVES

To find out the length weight relationship and Condition factor of *Chanda nama* and *Gudusia chapra* for a sustainable utilization of the resources.

### MATERIALS AND METHODS

The live specimens of *Chanda nama* and *Gudusia chapra* were collected from the fish market and fish landing sites in the Brahmaputra River at Uzan Bazaar Guwahati with coordinate at latitude: 26°11' 44.34" N and longitude: 91°45' 23.91" E, altitude 75m above sea level and Samaguri beels of Nagaon, Assam with coordinate at latitude: 26°25'31.48" N and longitude: 92°51' 43.33" E, altitude 89m above sea level for a period of 9 month and twice a month. Local fishermen were engaged for the collection of the proposed specimens. A short interview was taken from the fishermen about the fishing sites. Photographs of the freshly collected fish were taken whenever possible to record the colour in fresh condition of the specimens. The collected fish specimens were fixed and preserved in 10% formalin buffer solution in translucent bottles following Walsh & Meador (1998). For general counts and measurements, Kottelat (2001) is followed. Identification of species was followed from the book of Vishwanath *et al.* (2014) and Vishwanath (2002). To measure the length weight the specimens were measure with the vernier caliper in millimetre which later converted to centimetre and digital weighing machine in gram respectively.

To study the length-weight relationship, a total of 60 numbers of specimens is required for good result and it is calculated by the formula of Le Cren (1951).

$$W = a \times L^b$$

Where, W = weight in gram, L= Total length in cm and 'a'= coefficient and

'b' = the exponent which describe if the growth is isometric or allometric are constant form of the formula.

If b value is equal to 3 then the growth of fish indicated the isometric growth. If the value of b is not equal to 3 it is the allometric growth i.e., if its more than 3 it is the positive allometric and if it's less than 3 it is a negative allometric.

Condition factor or Ponderal index is determined, using the following formula given Carlander (1977):

$$K = W 10^5 / L^3$$

Where, K = Condition factor; W = weight of the fish; and L = length of the fish; the number;

$10^5$  = a factor to bring the Ponderal index (K) near to unity.



**Figure 1: Map of Uzan Bazaar fish market (first fish landing site).**



**Figure 2. Map of Samaguri beel, Nagaon (second fish landing site).**

## RESULT AND DISCUSSION

### Length Weight Relationship.

In this study the size ranges is from 2.8cm–8.91cm and weight is 0.19g –4.86g for *Chanda nama* and *Gudusia chapra* the size ranges from 4.26cm–12.13cm and weight is 0.67g –16.81g. For

checking the relationship between the length and the weight of *Chanda nama* and *Gudusia chapra*, statistical analysis like regression and  $R^2$  (Correlation) are calculated for different months as shown in table1 and 2. It is also represented graphically in figure 3 and figure 4.

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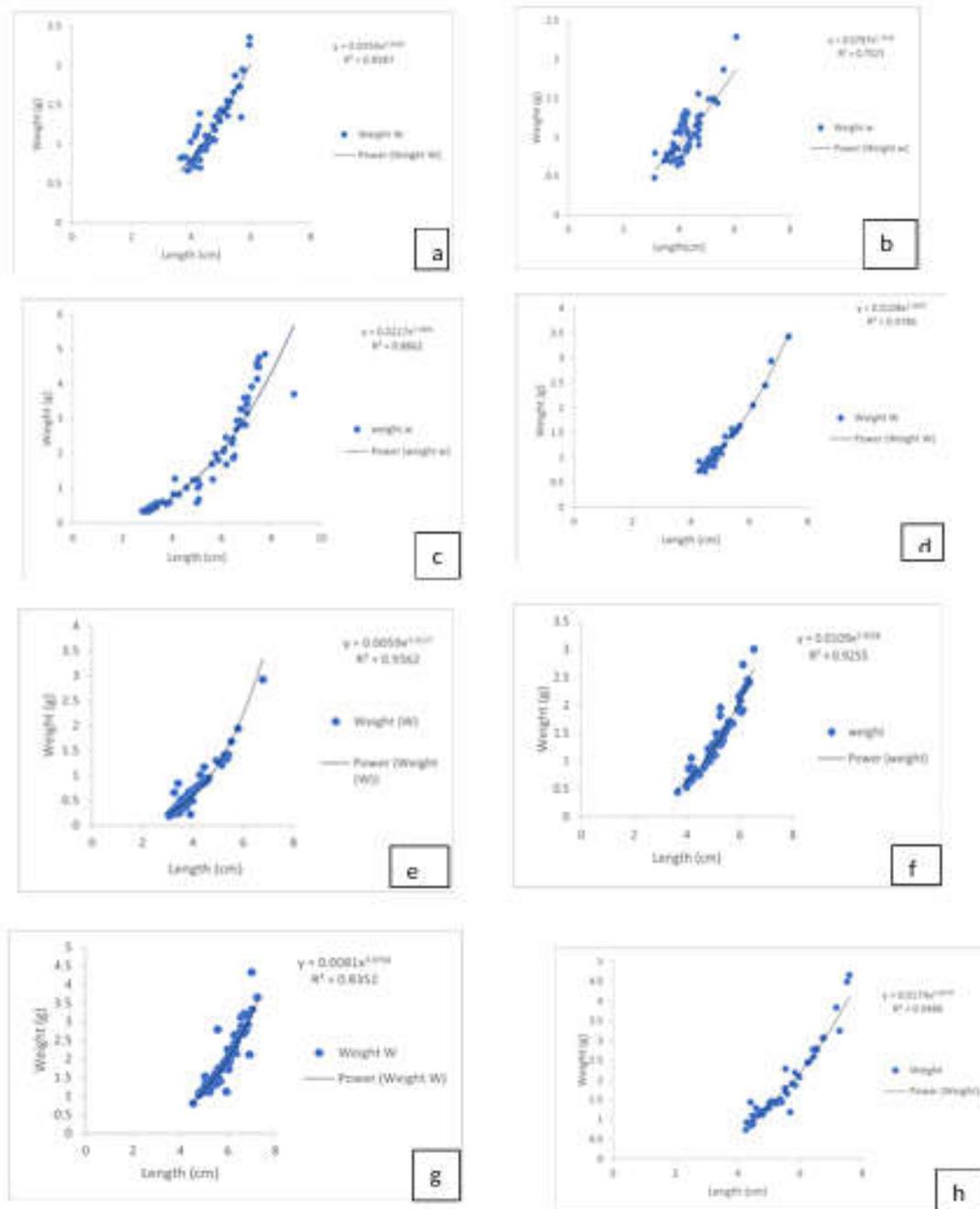
**Table 1: Month wise Length Weight relationship of *Chanda nama***

n- Numbers of specimens, R<sup>2</sup> - Correlation.

Month	n	Total length (cm)	Weight (g)	Regression parameters		95% confidence interval		R <sup>2</sup>
				a	b	a	b	
August 2023	59	3.75–5.96	0.7–2.36	0.03	2.26	0.02–0.05	1.98–2.54	0.82
September 2023	61	3.11–6.09	0.48–2.29	0.08	1.76	0.05–0.13	1.42–2.10	0.65
October 2023	59	2.8–8.91	0.32–4.86	0.02	2.55	0.02–0.03	2.37–2.72	0.94
November 2023	60	4.28–6.74	0.72–3.43	0.01	2.90	0.01–0.014	2.73–3.07	0.95
December 2023	--	--	--	--	--	--	--	--
January 2024	63	3.04–6.78	0.19–2.93	0.01	3.31	0.003–0.01	2.97–3.65	0.86
February 2024	64	3.64–6.52	0.45–3	0.01	2.93	0.01–0.015	2.73–3.14	0.93
March 2024	61	4.54–7.25	0.82–4.33	0.01	3.07	0.004–0.01	2.74–3.41	0.85
April 2024	50	4.27–7.58	0.74–4.66	0.02	2.69	0.01–0.02	2.47–2.92	0.92

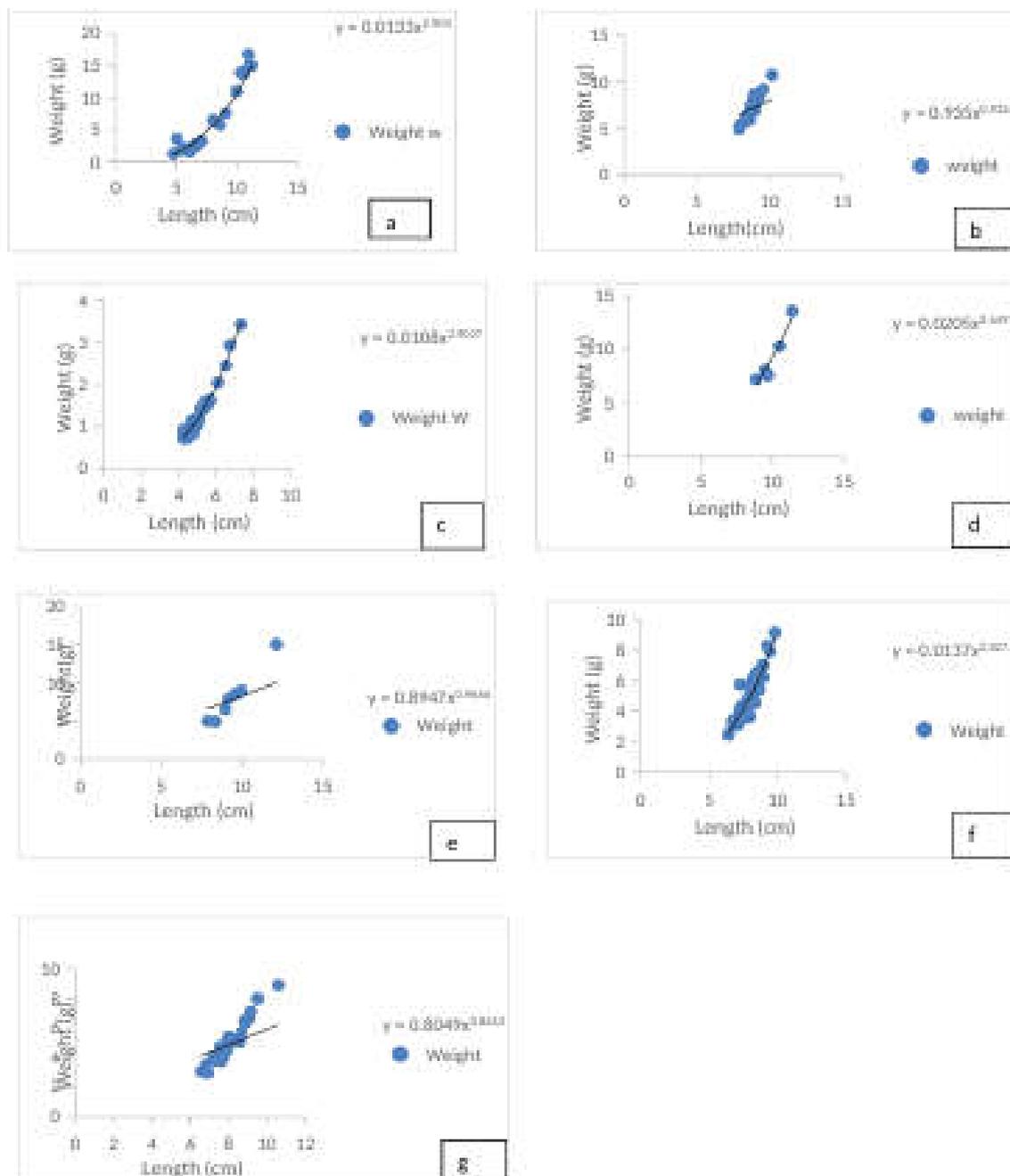
**Table 2: Month wise Length weight relationship of *Gudusia chapra*.**

Month	n	Total length cm	Weight g	Regression parameters		95% confidence interval		R <sup>2</sup>
				a	b	a	b	
August 2023	20	4.76–11.26	1.28–16.81	0.01	2.90	0.005– 0.03	2.43–3.37	0.90
September 2023	--	--	--	--	--	--	--	--
October 2023	21	7.88–10.16	4.87–10.73	0.01	3.19	0.002–0.02	2.74–3.65	0.92
November 2023	21	4.26–5.84	0.67–1.78	0.01	2.9	0.006–0.02	2.56–3.24	0.94
December 2023	--	--	--	--	--	--	--	--
January 2024	5	8.87–11.39	7.16–13.56	0.02	2.65	0.001–0.48	1.27–4.02	0.93
February 2024	7	7.88–12.13	4.89–15.02	0.02	2.73	0.004–0.06	2.14–3.33	0.96
March 2024	60	6.43–9.83	2.48–9.17	0.01	2.83	0.007– 0.03	2.51–3.14	0.84
April 2024	27	6.57–10.6	2.95–8.9	0.03	2.48	0.01–0.05	2.18–2.78	0.92



**Figure 3.** Length weight relationship graph of *Chanda nama* for different months; (a)August, (b) September, (c) October, (d) November, (e) January, (f) February, (g) March, (h) April.

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**Figure 4: Length weight relationship graph of *Gudusia chapra* for different months; (a) August, (b) October, (c) November, (d) January, (e) February, (f) March, (g) April.**

The tables above clearly show the differences in the value on length and weight as recorded in different months. For the species *Chanda nama*, it shows positive allometric growth in the month of January with b value = 3.31, R<sup>2</sup>= 0.86, total length

ranges from 3.04– 6.68 and weight ranges from 0.19– 2.93. In the month of August, September, October and April the b value shows negative allometric growth as its value is less than 3. This is similar to the previous studies as reported by

(Khoso *et al.*, 2018). In the month of November and February the b value is approximately =3 also in the month of March the b value is exactly =3 which is as supported by (Ahmed *et al.*, 2019); (Sangma *et al.*, 2019). Thus, these three months indicate isometric growth condition. The species *Gudusia chapra* also shows fluctuation in calculated b values in different study months. In the month of November and August b value =2.9, showing isometric growth which has similar findings with the previous studies by (Ahmed *et al.*, 2021); (Vinci *et al.*, 2005). In the month of October b=3.19 showing positive allometric growth. In the month of January, February, March and April, the b value less than 3 indicating the negative allometric growth which has similar findings as reported by (Ahamed *et al.*, 2014); (Sheikh *et al.*, 2017). For both the species studied the R<sup>2</sup> value is observed to be

positive in all the months indicating a positive correlation between length and weight. The variation in the b value may be due to a number of factors including gonad maturity, diet, health (Banegal and Tesch, 1978; Tesch, 1971; Ahamed *et al.*, 2014) and low sample size in few of the study months as reported from earlier study on length weight relationship.

**Condition Factor of *Chanda nama* and *Gudusia chapra*.**

The condition factor (K) determines the state of well-being. The fish is considered to be in good condition when the condition factor =1. The condition factor value for *Chanda nama* in all the months is observed to be 1 whereas it ranges from 1.00 to 19.18 for *Gudusia chapra* as represented in the table 3 and 4.

**Table 3: Month wise condition factor of *Chanda nama***

Months	Condition factor	No of specimen collected
August 2023	1.01	59
September 2023	1.01	61
October 2023	1.02	59
November 2023	1.01	60
December 2023	---	---
January 2024	1.03	63
February 2024	1.00	64
March 2024	1.02	61
April 2024	1.01	50

**Table 4: Month wise condition factor of *Gudusia chapra***

Months	Condition factor	No of specimen collected
August 2023	19.28	20
September 2023	---	---
October 2023	8.45	21
November 2023	1.00	21
December 2023	---	---
January 2024	1.00	5
February 2024	5.55	7
March 2024	1.01	60
April 2024	1.04	27

As shown in the table 3, in species *Chanda nama*, the condition factor value in all of the months is equal to 1. This value is different from the finding of (Ahmed *et al.*, 2019) where the value reported was ranging from 1.63 to 2.21. But for the species *Gudusia chapra*, the condition factor shows

variation in different month. A good condition factor with the value of 1 is observed in the month of November, January, March, April as shown in table number 4. The condition factor value =1 indicates its good health state. A good condition factor is also an indication of the good

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condition of the area in which the fish inhabits. It also depends on the season. Thus, in this month *Gudusia chapra* attain the good health condition. This present value of condition factor ranging from 1.00 to 19.18 is different with the finding of (Sheikh *et al.*, 2017) collected from Dalani beel, Assam with their value ranging from 0.63 to 1.45. The differences in finding are due to low sample size or it could also be the variation in the specimen size.

### CONCLUSION

In conclusion, the study of Length -Weight Relationship of fish has a significant importance in studying the growth and general wellbeing of fish population. As shown in the result the condition factor of *Chanda nama* indicates a good state of general wellbeing population with the Length -Weight relationship showing the isomeric growth in the month of November, February and March. This study will reflect the importance in future assessment in aquaculture management or in economic development and also to maintain their diversity in the area. However, a more detail and extensive research with bigger sample size is required in the future.

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