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Relationship between Total Length, Standard Length and Scale Length of Freshwater Fish *Labeo rohita*

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Abstract: ***The length weight relationship, total length-standard length relationship and fish length–average total scale length relationship of Labeo rohita were studied during the year 2013-2014 by correlation and regression method. Positive correlation between total length and weight of fish, standard length and total length was observed. Studies on relation between fish length and average total scale length was also found positive.***

Keywords: Average total scale length, *Labeo rohita*, total length, standard length

1. Introduction

Length-weight and length-length relationships of fish species from Chi river, northern Thailand was studied by R. Satrawaha, C.Pilasamorn, 2009).Growth of an organism means change in length or weight or both with the increasing age (Ambika Dhakal, Bharat Raj Subba, 2003). Length–weight relationship have various uses in fisheries research and management, accurate estimates of total catch are available for several fisheries in the western Pacific (P.J.Ward, C.M.Ramirez1992). Condition, length-weight, length of fish at the time of previous annulus formation can be calculated from the length of the scales and their annuli (Herman B. Chase). The aim of the present study is to determine the relationship between length-weight, total length-standard length and total length–scale length of Labeo rohita.

2. Materials and Methods

Fish samples of Labeo rohita were brought to the fishery laboratory and fixed in 5% formalin solution. Fishes were measured for total length and standard length in (cm) and weighed in (gm) using scale and digital balance. The standard length measurement was taken from the tip of the snout to the base of the tail in cm. (S.Subha and S.Adhikaree, 2010) 10 scales were taken from above the lateral line and just posterior to the base of the dorsal fin. (R.J.Beamish, H.H.Harvey, 1969).These scales were placed in separate envelopes for further study, the average total length of fish was calculated. The data obtained from the measurements were computed for regression and correlation coefficient values. (S.Subba, S.Adhikaree, 2011).

3. Results

Relationship between total length and standard length (TL & SL) was determined according to the Pearson correlation and regression method. The total length and standard length was calculated as r =0.999.

Log TL =2.75+ 1.02 Log SL.

When logarithmic value of TL was plotted on the co-ordinate (y–axis) against SL (x-axis) it gives straight line. (Graph1).Thus the total length is positive co-related with the standard length.

The length-weight relationship of Labeo rohita was analyzed using Pearson correlation and regression equation. The body weight was positively correlated with the total length. The correlation coefficient (r) value was 0.950 and regression equation was as follows
Log L = 13.2 + 0.0225 Log W.

It was observed that the positive correlation exist between total length and average scale length of Labeo rohita, here r value is 0.962. The regression of total on average scale length was
TL= -4.22+30.9 ASL.

4. Discussion

Many worker have studied length-length relationship Ali Kara, Bahar ayhan, (2008) Md.yeamin Hossain,(2010), D.K.Moutopoulos, K.I.Stergiou,(2002), S.Subba, S.Adhikaree,(2011), Deniz Erguden, Cemal Turan et al,(2011).and observed positive correlation for total length and standard length.

The relationship between body weight and length is simple but essential in fishery management (Babori, D.C, D.K.Moutopoulos, M.Bekri et al (2010).The present study reported positive correlation between length-weight relationship which indicates as the weight increases the length of fish also increases, Similar results were obtained by Manoharan J, Gopalkrishnan A, Varadhrajan D.,et al (2013), Safoura Sedaghat, Seyed Abbas Hoseini, 2012).The length-weight relationship is also of great importance for comparative growth studies (D.K.Moutopoulos and K.I Stergiou, 2002).

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Total length-average scale length was studied separately, results show positive correlation between total length and average scale length of Labeo rohita. This confirms to the earlier studies by Herman. B.Chase (1946).

5. Conclusion

Present study was based on different parameters of fish Labeo rohita like length-weight, total length-standard length, total length-scale length. From length-weight and total length-standard length relationship it is clear that the growth of Labeo rohita is positive allomatric in nature, it had been also concluded that the corelation between total length-scale length relationship was found to be positive.

6. Acknowledgments

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Table 1: Relationship between Total Length and Standard Length of fish Labeo rohita

Sr. No.	Total Length of Fish(cm)	Standard Length Of Fish(cm)	Sr. No.	Total Length of Fish(cm)	Standard Length Of Fish(cm)	Sr. No.	Total Length of Fish(cm)	Standard Length Of Fish(cm)
1	45	41.3	35	19	15.6	69	46	42.2
2	35	33	36	49	45	70	20	15.9
3	37	34.8	37	19	15.6	71	31	28.5
4	48	44.1	38	64	59.4	72	42	38
5	46	42.2	39	47	43.7	73	47	43.4
6	43	39.5	40	58	54.9	74	44	40.2
7	48	44.1	41	31	28.5	75	37	34.8
8	50	46.2	42	47	43.7	76	35	33
9	59	55.8	43	37	34.8	77	57	53.5
10	49	45	44	46	42.2	78	40	36.4
11	63	58.3	45	37	34.8	79	45	41.3
12	48	44.1	46	38	35	80	59	55.8
13	47	43.4	47	51	47.1	81	17.5	14.9
14	48	44.1	48	39	35.2	82	19	15.6
15	44	40.2	49	21	16.2	83	43	39.5
16	37	34.8	50	20	15.9	84	46	42.2
17	49	45	51	18	15.1	85	50	46.2
18	39	35.2	52	25	22	86	63	58.3
19	37	34.8	53	42	38	87	38	35
20	39	35.2	54	51	47.1	88	42	38
21	18.5	15.3	55	35	33	89	21	16.2
22	19	15.6	56	18.5	15.3	90	24	21
23	18	15.1	57	49	45	91	27	24
24	17.5	14.9	58	45	41.3	92	17	14.8
25	18.5	15.3	59	61	56.8	93	18.5	15.3
26	19	15.6	60	32	29.5	94	19	15.6
27	19	15.6	61	51	47.1	95	51	47.1
28	18.5	15.3	62	21	16.2	96	63	58.3
29	17.5	14.9	63	37	34.8	97	42	38
30	18.5	15.3	64	19	15.6	98	46	42.2
31	17.5	14.9	65	48	44.1	99	49	45
32	17	14.8	66	54	50.1	100	64	59.4
33	18.5	15.3	67	58	55			
34	17	14.8	68	19	15.6			

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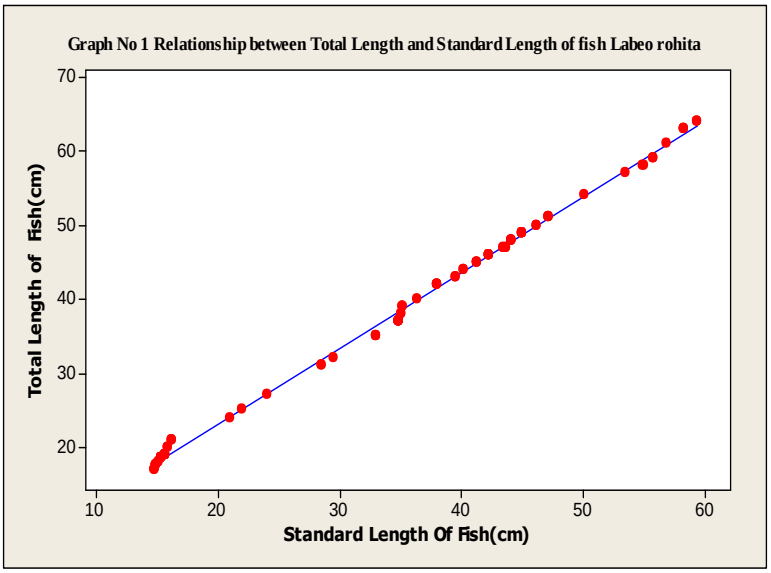

Pearson correlation of TLF SLF and = 0.999

The regression equation is total Length of Fish (cm) = 2.75+1.02 Standard Length of Fish (cm)

Table 2: Relationship between Fish Total length and weight of fish Labeo rohita

Sr. No.	Fish Total length (cm)	Fish Weight (gm)	Sr. No.	Fish Total length (cm)	Fish Weight (gm)	Sr. No.	Fish Total length (cm)	Fish Weight (gm)
1	45	1473	35	19	210	69	46	1500
2	35	1200	36	49	1590	70	20	255
3	37	1340	37	19	217	71	31	1005
4	48	1583	38	64	1670	72	42	1435
5	46	1500	39	47	1560	73	47	1560
6	43	1445	40	58	1660	74	44	1460
7	48	1580	41	31	1005	75	37	1360
8	50	1600	42	47	1560	76	35	1200
9	59	1670	43	37	1345	77	57	1650
10	49	1590	44	46	1490	78	40	1425
11	63	1664	45	37	1348	79	45	1475
12	48	1580	46	38	1405	80	59	1670
13	47	1560	47	51	1610	81	17.5	130
14	48	1582	48	39	1410	82	19	220
15	44	1468	49	21	300	83	43	1447
16	37	1360	50	20	250	84	46	1490
17	49	1590	51	18	150	85	50	1600
18	39	1410	52	25	590	86	63	1664
19	37	1360	53	42	1435	87	38	1405
20	39	1410	54	51	1610	88	42	1430
21	18.5	185	55	35	1200	89	21	278
22	19	220	56	18.5	190	90	24	520
23	18	148	57	49	1591	91	27	705
24	17.5	127	58	45	1475	92	17	105
25	18.5	190	59	61	1685	93	18.5	188
26	19	218	60	32	1050	94	19	217
27	19	218	61	51	1610	95	51	1610
28	18.5	170	62	21	278	96	63	1664
29	17.5	130	63	37	1345	97	42	1428
30	18.5	170	64	19	210	98	46	1500
31	17.5	125	65	48	1582	99	49	1591
32	17	100	66	54	1625	100	64	1670
33	18.5	188	67	58	1660			
34	17	100	68	19	215			

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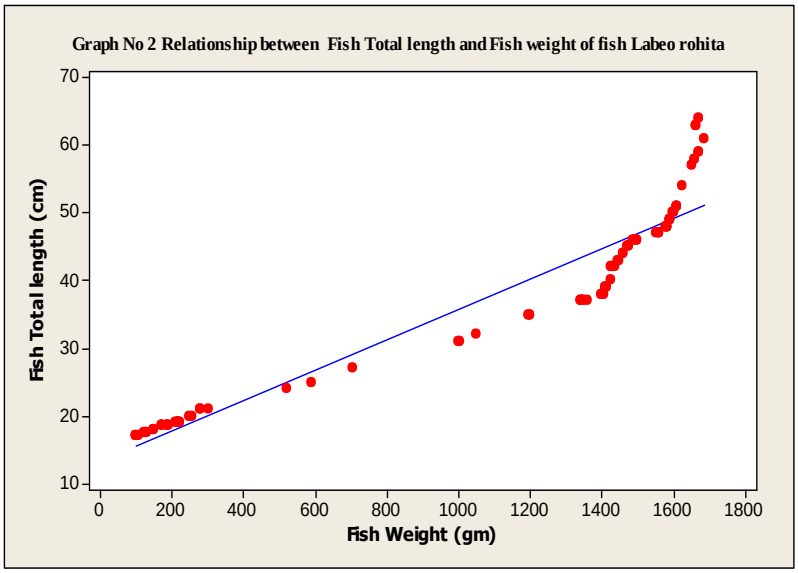

Pearson correlation of FTL and FW = 0.950
The regression equation is Total Length of Fish (cm)=13.2 + 0.0225 Fish (gm)

Table 3: Relationship between Total length and Average total scale length of fish Labeo rohita

Sr. No.	Fish Total length (cm)	Average total scale length (cm)(Avg.)	Sr. No.	Fish total length (cm)	Average total scale length (cm)(Avg.)	Sr. No.	Fish Total length (cm)	Average total scale length (cm)(Avg.)
1	45	1.66	35	19	0.72	69	46	1.67
2	35	1.46	36	49	1.71	70	20	0.75
3	37	1.51	37	19	0.72	71	31	1.25
4	48	1.70	38	64	1.86	72	42	1.61
5	46	1.67	39	47	1.69	73	47	1.69
6	43	1.63	40	58	1.80	74	44	1.64
7	48	1.70	41	31	1.25	75	37	1.51
8	50	1.73	42	47	1.69	76	35	1.46
9	59	1.81	43	37	1.51	77	57	1.80
10	49	1.71	44	46	1.67	78	40	1.60
11	63	1.85	45	37	1.51	79	45	1.66
12	48	1.70	46	38	1.53	80	59	1.81
13	47	1.69	47	51	1.75	81	17.5	0.64
14	48	1.70	48	39	1.58	82	19	0.72
15	44	1.64	49	21	0.78	83	43	1.63
16	37	1.51	50	20	0.75	84	46	1.67
17	49	1.71	51	18	0.69	85	50	1.73
18	39	1.58	52	25	0.96	86	63	1.85
19	37	1.51	53	42	1.61	87	38	1.53
20	39	1.58	54	51	1.75	88	42	1.61
21	18.5	0.70	55	35	1.46	89	21	0.78
22	19	0.72	56	18.5	0.70	90	24	0.95
23	18	0.69	57	49	1.71	91	27	0.99
24	17.5	0.64	58	45	1.66	92	17	0.63
25	18.5	0.70	59	61	1.83	93	18.5	0.70
26	19	0.72	60	32	1.30	94	19	0.72
27	19	0.72	61	51	1.75	95	51	1.75
28	18.5	0.70	62	21	0.78	96	63	1.85
29	17.5	0.64	63	37	1.51	97	42	1.61
30	18.5	0.70	64	19	0.72	98	46	1.67
31	17.5	0.64	65	48	1.70	99	49	1.71
32	17	0.63	66	54	1.77	100	64	1.68
33	18.5	0.70	67	58	1.80			
34	17	0.63	68	19	0.72			

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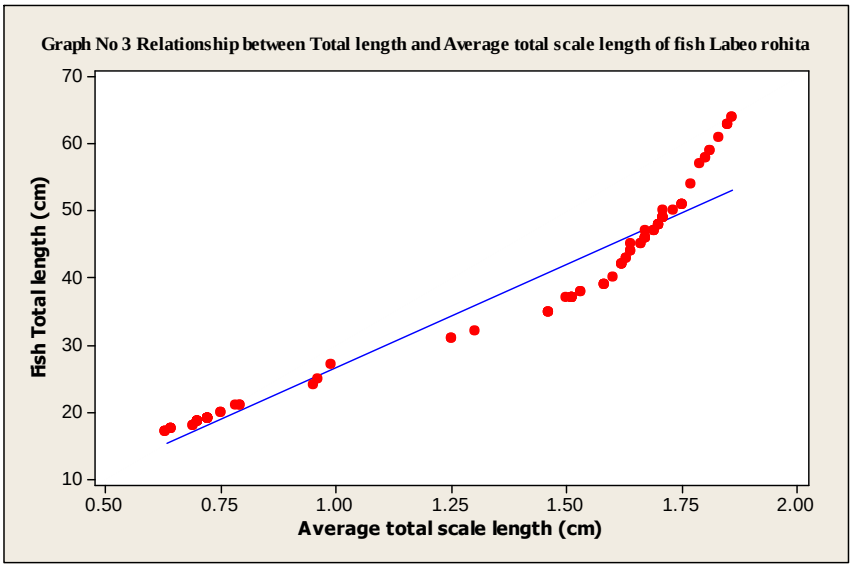

Pearson correlation of FTL and TSL = 0.962
The regression equation is
Total Length of Fish (cm) = -4.22 + 30.9 Total scale length (cm)

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