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Biochemical Composition of Rui (Labeo rohita),Catla (Catla catla), Tilapia (Oreochromis mossambicus) of Cultured Ponds and Different Markets of Bangladesh

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Abstract*—Biochemical composition of three firmed fishes named Rui (Labeo rohita), Catla (Catla catla), Tilapia (Oreochromis mossambicus) from cultured ponds, wholesale markets and local retail markets were studied in order to evaluate their nutritional values. The mean value of moisture was 76.62% in rui, 74.86% in catla, 74.86% in Tilapia. The mean value of ash was 1.90% in Rui, 1.81% in Catla, 1.16% in Tilapia. The average value of fat content was 7.35% in Rui, 7.23% in catla and 10.22% in Tilapia. The average value of protein were 17.34% in Rui, 19.54% in Catla and 17.21% in Tilapia. Each of these three fishes was collected from 9 different sources. The sources were Cultured ponds, Wholesale Markets and Local Retail Markets. Significantly highest amount of moisture content was 74.86% in Rui (Labeo rohita), Ash and protein variation was highest in Catla (Catla catla) fishes, Fat variation was highest in Tilapia (Oreochromis mossambicus). This study helps people to compare the moisture, ash, protein and fat variation among these fishes. From this study, we observed that all these cultures species are rich in food value.
***Keywords*— biochemical, rui, catla, tilapia, Bangladesh**

I. INTRODUCTION

Fish is known to be one of the cheapest sources of animal protein and other essential nutrients required in human diets [1]. Fish and Fisheries have been playing a very significant role in nutrition, culture and economy of Bangladesh from time immemorial [2]. Bangladesh is one of the world's leading fish producing countries with a total production of 32.62 MT. The sector's contribution to the national economy is much higher than its 4.39% share in GDP, as it provides about 60% of the animal protein intake [3]. Fish is a low-fat high quality protein. Fish is filled with omega-3 fatty acids and vitamins such as D and B2 (riboflavin). Fish is rich in calcium and phosphorus and a great source of minerals, such as iron, zinc, iodine, magnesium, and potassium.[4] Fish oil is also one of the most important natural sources of polyunsaturated fatty acids having two important x-3 PUFAs, EPA (Eicosapentaenoic Acid and DHA (Docosahexaenoic Acid) which have been proven to have useful effects on human body [5]. Most fish have protein contents between 15 and 30 wt%, fat contents between 0 and 25 wt%, and moisture contents between 50 and 80 wt% [6].So it is important to analyze biochemical composition of protein, fat and ash. Biochemical composition of fish varies from species to species and within the same species from one individual to another. Although several studies [7- 10] deal with the biochemical composition of many commercially important fishes but no work on Rui, Catla and Tilapia of different environmental condition. It is important to find out biochemical composition of fish that we consume regularly. This study was carried out to assess biochemical composition of the locally available Rui, Catla and Tilapia.

II. MATERIALS AND METHODS

A. Collection of samples

Fish samples were collected from 3 cultured ponds of Comilla, 3 wholesale market of Dhaka, and 3 retail local retail market of Dhaka using a sterile aseptic container together with ice .They were transported to laboratory with isolated iceboxes. For the analysis 3 species of fish were selected. These were *Labeo rohita, Catla catla, Oreochromis mossambicus.* In this study, following parameters of fish samples were examined- Moisture, Ash, Protein, Fat.

B. Preparation of samples

After reaching to laboratory samples were washed thoroughly with distilled water. Only the edible portions were taken for

experiment.

C. Methods of estimation

We estimated Moisture and ash contents of the fishes by AOAC method [11] The crude protein of the fish was conducted by Micro- Kjeldhal method [12] and Fat content was determined by Bligh and Dryer method [13].

Calculations:

Calculation of Moisture:

$$\text{Moisture (\%)} = \frac{\text{Weight loss}}{\text{Original weight of the sample taken}} \times 100$$

Calculation of Ash:

$$\text{Ash (\%)} = \frac{\text{Weight of dry samples}}{\text{Original weight of the samples taken}} \times 100$$

Calculation of Fat:

$$\text{Fat (\%)} = \frac{\text{Weight of the residus}}{\text{Weight of the samples taken}} \times 100$$

Calculation of Protein:

(%) Of Nitrogen = (Titration Reading-Blank Reading) ×Strength Of Acidx100/5×100/Weight Of The Sample

in this case empirical factor was 6.25 for the fish

$$\text{Protein (\%)} = \%\ \text{of Total } N_2 \times 6.25$$

III.RESULTS AND DISCUSSIONS

The nutrient values of 27 fishes collected from different ponds, Wholesale Market and Local Retails Markets are presented in Tables (1-3).We analysed Moisture %, Ash %, Fat %, Protein %.

Table 1: Proximate Composition of Rui (*Labeo rohita*) fishes

Samples	Moisture %	Ash %	Fat %	Protein %
Comilla Pond-1-Rui	73.39	1.55	8.35	18.55
Comilla Pond-2-Rui	76.29	2.18	6.23	17.3
Comilla Pond-3-Rui	75.89	2.1	9.03	17.01
Wholesale Market-1-Rui	77.25	2.17	6.78	17.11
Wholesale Market-2-Rui	76.79	2.5	7.88	17.35
Wholesale Market-3-Rui	78.09	1.82	8.03	16.4
Local Retail Market-1-Rui	76.93	1.84	7.18	17.05
Local Retail Market-2-Rui	77.94	1.69	6.26	18.11
Local Retail Market-3-Rui	77.02	1.28	6.48	17.22

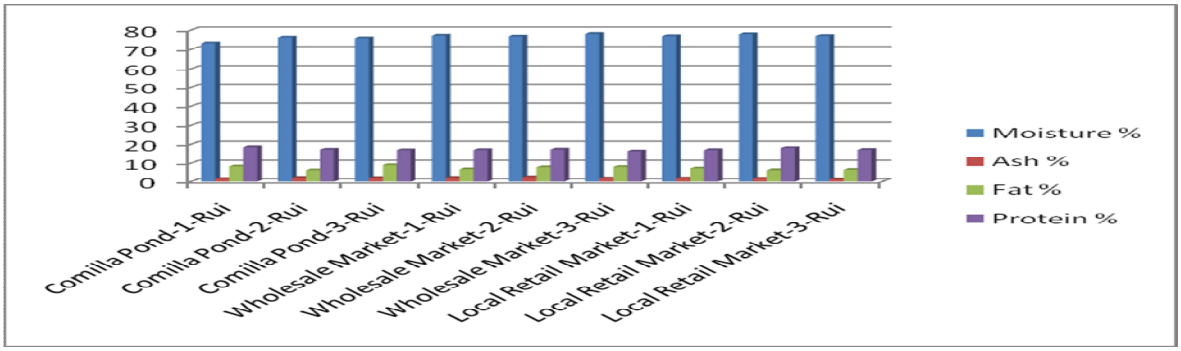

Fig-1: Variation of moisture, ash, fat and protein among Rui (*Labeo rohita*) fishes which collected from nine different sources.

Table 2: Proximate Composition of Catla (Catla catla) fishes

Samples	Moisture %	Ash %	Fat %	Protein %
Comilla Pond-1-Catla	74.44	2.66	5.78	20.12
Comilla Pond-2-Catla	74.93	1.8	7.3	19.97
Comilla Pond-3-Catla	75.44	1.9	7.51	19.15
Wholesale Market-1-Catla	74.72	2.25	8.1	18.93
Wholesale Market-2-Catla	72.53	1.55	7.22	20.72
Wholesale Market-3-Catla	76.65	1.77	6.00	18.58
Local Retail Market-1-Catla	75.36	1.64	8.02	19.18
Local Retail Market-2-Catla	74.72	1.41	7.52	19.15
Local Retail Market-3-Catla	75.02	1.36	7.61	20.09

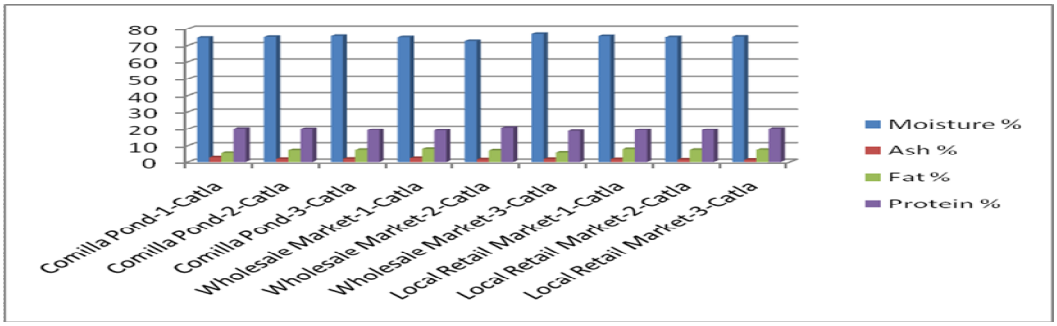

Fig-2: Variation of moisture, ash, fat and protein among Catla (Catla catla) fishes which collected from nine different sources.

Table 3: Proximate Composition of Tilapia (*Oreochromis mossambicus*) fishes

Samples	Moisture %	Ash %	Fat %	Protein %
Comilla Pond-1-Tilapia	76.85	0.92	9.30	16.93
Comilla Pond-2-Tilapia	75.34	1.08	8.92	17.01
Comilla Pond-3-Tilapia	73.9	1.19	10.69	17.22
Wholesale Market-1-Tilapia	75.16	1.16	10.91	17.25
Wholesale Market-2-Tilapia	73.53	1.17	12.22	17.08
Wholesale Market-3-Tilapia	74.03	1.41	10.18	17.88
Local Retail Market-1-Tilapia	72.92	1.26	10.46	18.12
Local Retail Market-2-Tilapia	76.2	1.28	9.38	16.14
Local Retail Market-3-Tilapia	75.86	0.99	9.93	17.22

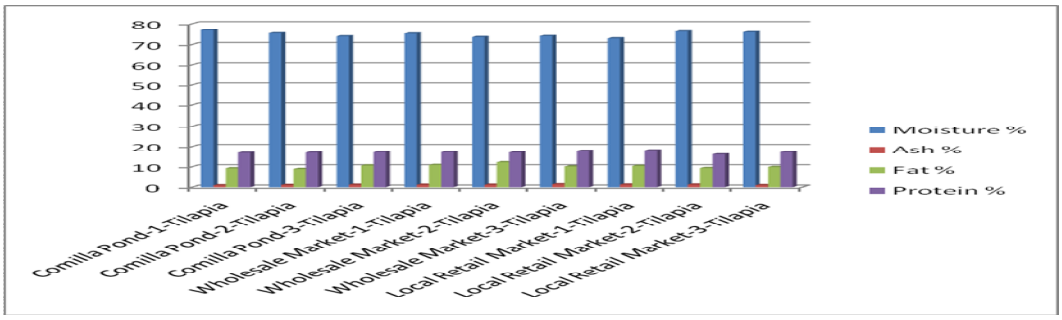

Fig-3: Variation of moisture, ash, fat and protein among Tilapia (*Oreochromis mossambicus*) fishes which collected from nine different sources.

Moisture variation: From table 1 we found that moisture percentage of Rui (*Labeo rohita)* fishes which collected from nine different sources were ranged from 73.39% to 78.09%. The average value of moisture content was 76.62% which was near to the finding of Pradhan *et al*. (2012) [14] and Mahboob *et al.* (2004) [15]. From fig-1 we found that moisture content was highest in the Rui fish which was collected from Wholesale Market-3. In case of Catla (in table 2) it was examined that moisture percentage of Catla (Catla catla) fishes which collected from nine different sources were ranged from 72.53% to 76.65%. The average value of moisture content was 74.86% which was less or more similar to the findings reported by Shakir *et al.* (2013)[16] and Manirujjaman *et al*. (2014)[17]. From fig-2 we found that moisture content was highest in the Catla (Catla catla) which was collected from Wholesale Market-3. From table 3 we saw that moisture percentage of Tilapia (*Oreochromis mossambicus*) fishes which collected from nine different sources was ranged from 72.92% to 76.85%. The average value of moisture content was 74.86% which support that reported by *Olagunju et al.* (2012)[18] and *Bag et al.* (2012)[19]. From fig-3 it was found that moisture content was highest in the Tilapia (*Oreochromis mossambicus*) which was collected from Comilla Pond-1.

Ash variation: Maximum and minimum Ash contents of Rui (*Labeo rohita*) fishes which collected from nine different sources was from 1.28% to 2.5%. The average value of Ash variation was 1.9%. We also find less or more similar results with the study of Pradhan et al(2012) [14] and Mahboob et al (2004)[15].We found highest content of Ash in the Wholesale- Market-2- Rui . From table 2 we analysed that Ash variation of Catla (Catla catla) fishes which collected from nine different sources is ranged from 1.41% to 2.66%. The average value of Ash variation was 1.81%. The ash content of the fish comply with the ranges found by Shakir et al (2013)[16] and Manirujjaman, M., et al (2014)[17]. From fig-2 we found that Ash percentage was highest in the Catla (Catla catla) which was collected from Comilla Pond-1. When we analysed Tilapia we found that (in table 3) Ash variation of Tilapia (*Oreochromis mossambicus*) fishes was rangds from .92% to 1.41%. The average value of Ash variation was 1.16%. to the finding of Olagunju A(2012)[18] and Mukti Pada Bag (2012)[19] reported similar results in their findings.. From fig-3 we found that Ash variation was highest in the Tilapia (*Oreochromis mossambicus*) which was collected from Wholesale Market-3.

Fat variation: In the present investigation, the fat contents among the 27 species ranges from 6.00 to 12.22 %.From table 1 we saw that Fat variation of Rui (*Labeo rohita*) fishes was ranged from 6.23% to 9.03%. The average value of Fat variation is 7.35 which was supported by the study of Pradhan *et al.* (2012) [14] and Mahboob *et al*. (2004)[15]. From fig-1 we found that Fat variation was highest in the Rui fish which was collected from Comilla Pond-3. From table 2 it is examined that Fat variation of Catla (Catla catla) fishes which collected from nine different sources. It is ranges from 5.78% to 8.1%. The average value of Fat variation is 7.23 which was lower than that reported by Hafiz Abdullah Shakir et al (2013)[16] and Manirujjaman, M., et al (2014)[17]. From fig-2 we found that fat content was highest in the Catla (Catla catla) which was collected from Wholesale Market-1. In case of tilapia fat percentage ranges from 8.92% to 12.22%. The average value of fat was 10.22%.We find samiliar result in the finding of Olagunju (2012)[18] and Bag (2012)[19]. From fig-3 we found that Fat variation was highest in the Tilapia (*Oreochromis mossambicus*) which was collected from Wholesale Market-2.

Protein variation: The estimated protein content variation of Rui (*Labeo rohita*) fishes of nine different sources different sources was ranged from 16.4% to 18.55%. The average value of Protein variation was 17.34% which is near to the finding of Pradhan et al(2012) [14] and Mahboob et al (2004)[15]. From fig-1 we found that Protein variation was highest in the Rui fish which was collected from Comilla Pond-1. From table 2 it was observed that Protein variation of Catla (Catla catla) fishes ranged from 18.58% to 20.72%. The average value of Protein variation was 19.54% which supported the finding reported by by Shakir et al (2013)[16] and Manirujjaman et al (2014)[17]. From fig-2 we found that Protein content was highest in the Catla (Catla catla) which was collected from Wholesale Market-2. From table 3 we saw that Protein variation of Tilapia (*Oreochromis mossambicus*) fishes ranged from 16.14% to 18.12%. The average value of Protein variation was 17.21% which was lower than that reported by Olagunju (2012)[18] Bag (2012)[19]. From fig-3 we found that Fat variation was highest in the Tilapia (*Oreochromis mossambicus*) which was collected from Local Retail Market-1.

IV. CONCLUSIONS

From the present experiment it can be stated that biochemical composition of different fishes varies with species. All the three species are rich in protein content so they are important source of animal protein. As they have high amount of protein increasing the productions of these three species can reduce the animal protein requirements of Bangladesh. These results also suggest that the proximate composition of fish species greatly varies due to physiological reasons and changes in environmental conditions.

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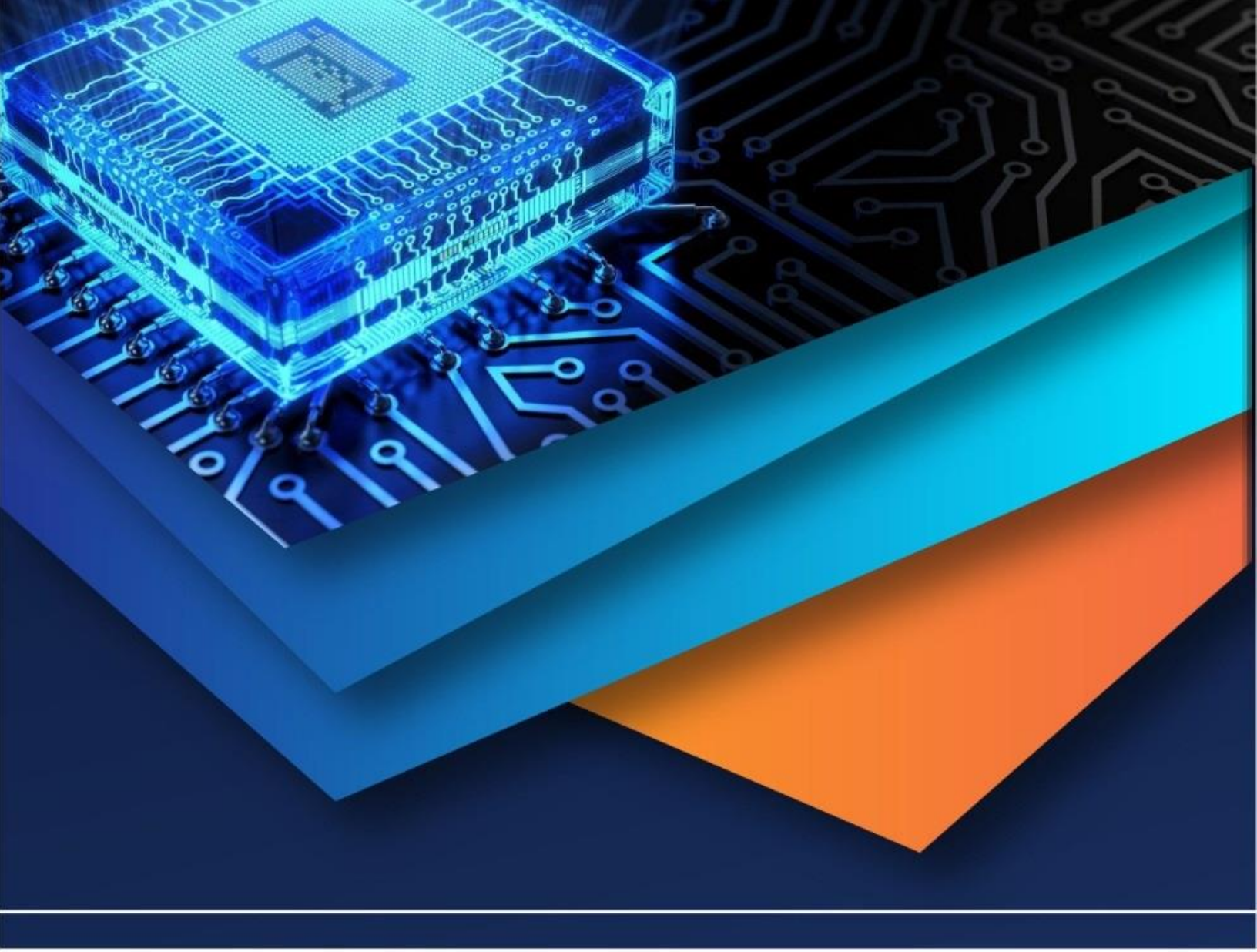

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