

The weather during the summer season (March to June) remained bright and sunny throughout the investigation. In the winter season (July to October) the weather was bright and sunny with the clear or lightly clouded sky. The rainy season was marked with heavily clouded or clouded weather with frequent rain.

□ From the month of November to March (winter season) it was found to be clear and transparent but pale, greenish and rarely bluish green in color. In April and May (summer season) the water was turbid and opaque and from June to October (rainy season) it was fully muddy.

□ The mean value of pH for 2014 was 7.35 and for 2015 it was 7.5. The mean value of pH of the water body was during winter, summer, the rainy season for the whole study period were 7.88, 7.48 and 7.03 respectively

□ The mean value of pH for 2014 was 7.35 and for 2015 it was 7.5. The mean value of pH of the water body was during winter, summer, a rainy season for the whole study period were 7.88, 7.48 and 7.03 respectively

□ The values of dissolved oxygen content throughout the study period varied from 4.7 mg l⁻¹ to 8.2 mg l⁻¹. During the winter season, the DO values were higher (6.6 mg l⁻¹ to 8.2 mg l⁻¹). Comparatively low values were obtained in monsoon (6.1 mg l⁻¹ to 7.4 mg l⁻¹) and summer (5.0 mg l⁻¹ to 6.2 mg l⁻¹)

□ However, during the whole study period, the water body maintained a fairly agreeable level of dissolved oxygen. It was well above the critical limit (3.0 mg l⁻¹).

□ Throughout the observations phenolphthalein alkalinity was not encountered, whereas bicarbonate alkalinity was dominant and it fluctuated between 32.0 mg l⁻¹(monsoon) and 119.0mg l⁻¹(early summer).

□ The fluctuation of total hardness ranged from 68.8 mg l⁻¹ to 118.4 mg l⁻¹ with the highest value in May(118.4 mg l⁻¹) and the lowest value in September (68.8 mg l⁻¹).

□ The calcium concentration of the sample pond showed a variation from 3.3 mg l⁻¹(winter) to 9.5 mg l⁻¹(rainy) with the minimum value during February 2014 and the maximum value during July 2015. The lower value of calcium of the pond was found during winter (3.3 mg l⁻¹ to 5.6 mg l⁻¹) and higher the value during monsoon (6.5 mg l⁻¹ to 9.5 mg l⁻¹).

The phytoplankton population constituted of Chlorophyceae, Bacillariophyceae and Myxophyceae (Cyanophyceae). The Phytoplankton diversity illustrated 10 species of Chlorophyceae, 11 species of Bacillariophyceae and 12 species of Myxophyceae. Bacillariophyceae was dominant among all the phytoplankton followed by Chlorophyceae and then Myxophyceae.

□ In both the year population of phytoplankton, especially Chlorophyceae and Bacillariophyceae hit the highest point in the winter season, but the peak value in Myxophyceae was noticed during summer.

□ Zooplanktons found in sample water were estimated quantitatively and qualitatively, and they were recorded taxonomically after identification.

□ The zooplankton population comprised of Protozoa, Rotifers, Cladocera, Copepode, Ostracoda. Among zooplanktons, Cladocera and Protozoa dominated.

□ Out of these 4 species of Protozoa, 2 species of Rotifera, 3 species of Cladocera, 1 species of Copepoda and 1 species of Ostracoda were identified during the period of study.

□ *Daphnia* was identified as the dominant species among all the species of the zooplanktons. It was observed that the number of zooplanktons was generally higher in winter and in certain cases it is higher in summer. The value was minimum in the rainy season.

□ The diversity index (Hs) ranged from 0.63 to 2.30. During the winter season, the maximum value of diversity index was recorded and the minimum value was recorded during the rainy season.

- Species equitability (j) fluctuated between 0.95 to 1.02. The maximum value of species equitability was recorded during the rainy season in the sample pond and minimum value during summer.
- The species richness index (d) ranged from 1.11 to 2.77. The species equitability was recorded maximum during winter and minimum during the rainy season.
- There was a steady variation of the annual mean GPP from $0.075 \pm 0.008 \text{ gC m}^3 \text{ h}^{-1}$ in September to $0.937 \pm 0.101 \text{ gC m}^3 \text{ h}^{-1}$ in March. Season wise, maximum GPP was observed in summer season and the minimum was during the rainy season. The systematic trend exhibited a well-defined seasonal pattern.
- The NPP value ranged from $0.028 \pm 0.003 \text{ g C m}^3 \text{ h}^{-1}$ to $0.832 \pm 0.083 \text{ gC m}^3 \text{ h}^{-1}$. During February i.e. in the winter season the maximum mean value of NPP was observed whereas minimum value was recorded during August i.e. in the rainy season was recorded for The maximum and minimum values of NPP showed no systematic pattern in relation to seasons.
- The ratio of NPP and GPP was the highest (0.78) in winter and lowest in the rainy season. The ratio of NPP and CR was maximum (7.09) in winter and minimum in the rainy season. However, the CR percentage of GPP was observed to be highest (0.52) during the rainy season and lowest in the winter season.
- *Labeo rohita* (Biochemical analysis of muscle):

Seasonal variation of moisture in different seasons was 77.50 (summer) to 81.04 (rainy) percent, 76.70 (summer) to 78.19 (rainy) percent, 75.02 (summer) to 78.12 (rainy) percent in A1, A2, A3 group of fish respectively. Season wise more amount of moisture was found in the rainy season in the female fish of the entire group (A1=81.04 percent, A2=78.19 percent, and A3=78.12 percent) whereas lower value was in the summer season. On the basis of different growth categories, moisture content was found to be decreased with increased with age.

The ash content was ranged from 0.92 to 1.38 percent in male and 0.82 to 1.40 percent in female fish. Both in male and female fish of different age categories had increasing ash content in winter whereas decreased values were observed in summer and rainy season. The ash content was in

decreasing order with increasing age. Seasonal variation of ash in different seasons was 1.18 (rainy) to 1.40 (winter) percent, 1.10(rainy) to 1.25 (winter) percent and 0.82 (rainy) to 1.10 (winter) percent in A1, A2, and A3 respectively.

Season wise analysis showed that in both the sexes the increased values were obtained in the summer but decreased values were in the winter and rainy season. The protein content was ranged between 16.04 (rainy) to 17.25 (summer) percent, 16.54 (rainy) to 17.83(summer) percent and 16.90(rainy) to 18.51 (summer) percent among the age group A1, A2 and A3 respectively.

It was clearly observed in the season-wise analysis that the maximum value was obtained in the summer and the minimum value was in the rainy season. The present investigation revealed that total lipid level showed a gradual increase with increasing age. The lipid content of fish in different groups were varied from 1.08(rainy) to 1.23 (summer) per cent, 1.18(rainy) to 1.51(summer) per cent and 1.48(rainy) to 2.30 (summer) per cent among the age group A1, A2, and A3 respectively.

Season and sex-wise analysis indicated the higher fatty acid observed in the summer and lower value in the rainy season. Female fish had a higher amount of fatty acid in comparison to males in each group. The fatty acid in fish different age groups was varied from 46.92 (rainy) to 57.43 (summer) per cent, 49.29 (rainy) to 51.52 (winter) per cent and 47.62 (rainy) to 59.12 (summer) per cent respectively.

Labeo rohita (Biochemical analysis of liver)

The moisture content of the liver of *Labeo rohita* was observed to be more in the summer and rainy season and whereas decreasing values were in the winter season. Sex wise analysis revealed that female had a higher value than that of male fish. In females, variation was in the range of 70.54 to 73.93 percent whereas, for males, it was in the range of 70.03 to 73.42 percent. Variation was more marked in the female in comparison to males.

Seasonal variation showed that higher value was in the spring but the lower value was noted in the summer and winter season but the lower value was noted in the rainy season. Variation range in mean values of ash content in different weight groups were 0.67(rainy) to 0.75 (winter), 0.60

(rainy) to 0.69 (summer) per cent and 0.56 (rain) to 0.65 (winter) percent in A1, A2, and A3 respectively.

It was observed in both the sexes of *Labeo rohita* that maximum lipid content was recorded in the winter season and minimum value in the rainy season. Variation range in mean values of ash content in different age groups were 10.68(rainy) to 11.23(summer) percent, 11.05(rainy) to 11.87(summer) percent and 12.68(rainy) to 12.56(summer) percent among A1, A2 and A3 respectively.

Variation range in the mean value of lipid content in different groups were 3.32 (rainy) to 3.89(summer) percent, 3.51(rainy) to 4.02(winter) percent and 3.00(rainy) to 4.53 (summer) in age group A1, A2, and A3 respectively. Seasonal variation showed that higher value was in the summer and lower value was noted in the rainy season. .It was found that increased lipid content observed in the large fish (A3) whereas a lower amount of lipid was in a smaller size (A1).

In present the investigation, the mean values were in the range of 50.35(rainy) to 55.35 (summer) per cent, 50.97 (winter) to 59.32 (summer) and 50.60 (rainy) to 56.71 (winter) in the A, A2, and A3 respectively. In both the sexes, the maximum value was obtained in summer whereas minimum in the rainy season. On the basis of weight, more fatty acid was found in the A2 category and least in the A1 group.

· *Cirrhinus mrigala* (Biochemical analysis of muscle):

Seasonal variation of moisture in different seasons was varied from 75.40 (winter) to 79.45 (rainy) percent in male, 75.51(winter) to 80.00 (rainy) percent in female fish. It has been shown that moisture content of *C. mrigala* increased during summer and rain whereas decreased during winter season Season wise more amount of moisture was found in the rainy season in the female fish of the entire group (A1=80.00 percent, A2=79.30 percent, and A3=77.46 percent) whereas lower value was in the winter season. On the basis of different growth categories moisture content was found to be decreased with increased with age.

The ash content was ranged from 1.11 to 1.50 percent in male and 0.90 to 1.56 percent in female fish. The more amount of ash was recovered in both the sexes in the winter season. Male had slightly more ash (1.56 percent). The ash content was in decreasing order with increasing

age and body weight. Seasonal variation of ash in different seasons were 1.34 (rainy) to 1.56 (winter), 1.25 (rainy) to 1.38 (summer) percent and 0.90(rainy) to 1.19 (winter) percent in A1, A2 and A3 group of fish respectively.

As per season wise analysis of protein content varied from 14.95 (rainy) to 17.84 (summer) per cent. Analysis of different age group showed A2 group had a higher mean value of protein content (16.68 percent) than A1 group of fish (15.87 percent) and A3 fish (16.62 percent). The range of variation of protein content was 14.95 (rainy) to 16.75 (summer) per cent, 16.08 (rainy) to 17.84 (summer) per cent and 15.45 (rainy) to 17.35 (summer) percent among the age group A1, A2 and A3 respectively.

Lipid content fluctuated from 1.10 (rain) to 2.36(summer) per cent in male and 1.05(rain) to 2.50(summer) per cent in female fish. In both the sex minimum value was obtained in the rainy season and maximum value in summer season. The analysis revealed that increased lipid content was found in the female of each group of *C.mrigala* (2.50, 2.01 and 2.30 per cent) in comparison to their male counterpart (1.87, 1.65 and 1.91 per cent).

Mean seasonal value of fatty acid content in *C. mrigala* throughout the study period was varied between 50.09 (rain) to 56.35 (summer) percent in male with seasonal mean value of 54.34 percent. The lowest value of fatty acid in male and female fish was noticed in the rainy season but the highest value was in the summer season. Middle-sized fish of age group A2 had higher fatty acid value than A1 and A3 irrespective of their sex. The mean values were in the range of 50.09 (rain) to 56.48 (winter) per cent, 53.31(rain) to 58.15 (summer) percent and 51.31(rain) to 56.35(summer) percent in the A1, A2 and A3 age group respectively.

□ *Cirrhinus mrigala* (Biochemical analysis of liver):

It was found that the moisture contents of the liver of *Cirrhinus mrigala* in different seasons varied from 69.30(winter) to 73.12(summer) percent in male with seasonal mean value 71.74 percent. The variation in female was 68.54(winter) to 73.67(rain) percent with a mean value of 71.77 percent. The moisture content of the liver was observed to be more in the summer and rainy season and whereas decreasing values were in the winter season. The size, age, the sex-wise analysis revealed that in smaller size group(A1) moisture content was higher

(73.67 percent) and lower in larger sized fish(68.54 percent). Seasonal variations range were 71.95(winter) to 73.67(rain) percent, 70.85(winter) to 72.75(rain) percent and 68.54(winter) to 72.17(summer) per cent in A1, A2, and A3 respectively.

Maximum ash was recovered in both the sexes of *Cirrhinus mrigala* in summer and minimum value in the rainy season. Sex wise analysis revealed that male of each age group has a higher ash percentage value in comparison to the female of that group.

It was observed that protein content of *Cirrhinus mrigala* varied from 10.67(rain) to 12.06(winter) per cent.in male and 10.61(rain) to 12.23 (winter) percent. Variation range in mean values of protein content in different age groups were 10.61(rainy) to 11.50 (summer) percent, 11.16(rainy) to 11.62(winter) percent and 11.01(rainy) to 12.23 (winter) percent among A1, A2, and A3 respectively

It was observed that the lipid content fluctuated from 3.34(rain) to 4.23(winter) percent in male with mean value 3.81 percent in male and 3.00(rain) to 4.47(summer) with mean value 3.84 percent. Seasonal variation showed that higher value was in the summer and winter in comparison to noted lower value in the rainy season. It was found that increased lipid content observed in the large fish (A3) whereas a lower amount of lipid was in the smaller size (A1).

The mean values were in the range of 51.60(rainy) to 56.76(winter) per cent, 51.65(rain) to 58.71(winter) and 50.28 (rainy) to 55.71(winter) in the A1, A2, and A3 respectively. In both the sexes, the maximum value was obtained in winter whereas minimum in the rainy season. On the basis of weight and age, more fatty acid was found in the medium-sized or A2 category and least in the A3 group

□ . *Catla catla*(Biochemical analysis of muscle):

Seasonal variation moisture of muscle of *Catla catla* in different seasons was 77.28(summer) to 79.58 (rainy) per cent, 76.50(winter) to 77.60 (rainy) per cent and 74.86 (winter) to 76.68(rain) in A1, A2, A3 group of fish respectively. On the basis of different growth categories moisture content was found to be decreased with increase in age.

The ash content of *Catla catla* was ranged from 1.11(rainy) to 1.40(winter) percent in male with seasonal mean 1.30 percent and 0.95(rainy) to 1.38(winter) percent in female fish with the mean value 1.23 percent. Both the sexes of fish of different age categories had increased ash

content in winter and summer and decreased values in the rainy season. The ash content was in decreasing order with increasing age and body weight. Seasonal variation of ash in different seasons were 1.20(rainy) to 1.40(winter), 1.17(rainy) to 1.38 (winter) percent and 0.95(rainy) to 1.28 (summer) percent in A1, A2, and A3 group of fish respectively.

It is observed that the protein content of *Catla catla* varied from 15.11(rainy) to 17.75(summer) percent. Sex wise protein content varied from 16.19(rain) to 17.75(summer) percent in male with mean value 17.08 percent and 15.11(rain) to 16.89(winter) percent in female fish with a mean value 16.07 percent. The range of variation of protein content was 15.11 (rainy) to 16.78 (summer) percent, 16.09(rainy) to 17.75(summer) percent and 15.21(rainy) to 17.72 (winter) percent among the age group A1, A2, and A3 respectively.

Lipid content fluctuated from 1.08 (rain) to 2.39(summer) percent in male and 1.08(rain) to 2.53(winter) percent in female fish. In both the sex, the minimum value was obtained in the rainy season and maximum value in the summer season. The mean values in the group A1, A2 and A3 were in the range from 1.08 (rain) to 1.51(summer) per cent, 1.78 (rain) to 2.28 (summer) per cent and 1.64 (rain) to 2.53 (summer) percent respectively.

Average seasonal value of fatty acid content in *Catla catla* throughout the study period was varied between 50.82(rain) to 57.02 (summer) percent in male with the seasonal mean value of 54.67 percent. The mean values wherein the range of 51.62 (rain) to 55.61(summer) percent, 54.41(winter) to 58.62(summer) percent and 50.31(rain) to 59.78 (summer) percent in the A1, A2 and A3 age group respectively.

□ *Catla catla* (Biochemical analysis of liver):

The ash content was ranged from 0.63(rain) to 0.73(summer) percent in male and 0.57 (rain) to 0.72(summer) percent in female fish. Seasonal variation of ash in different age groups varied from 0.67(rain) to 0.73(summer) percent, 0.65(winter) to 0.71(summer) percent and 0.57(rain) to 0.67(winter) percent in A1, A2, and A3 respectively. Season wise more amount of ash was found in the summer season.

It is observed that protein content varied from 10.35(rainy) to 12.16(summer) percent. Sex wise protein content varied from 10.56(rain) to 12.16(summer) percent in male with mean value 11.45 percent and 10.35(rain) to 12.03(winter) with a mean value 11.23 percent. The range of variation of protein content was 10.35 (rainy) to 11.15(winter) percent, 11.06(rainy) to 11.78(summer) percent and 10.92(rainy) to 12.16 (winter) percent among the age group A1, A2 and A3 respectively.

As per analysis lipid content fluctuated from 3.21(rain) to 4.47 (summer) percent in male with a mean value of 3.87 percent and 3.20(rain) to 4.63(summer) percent in female fish with mean value 3.96 percent. The mean value of lipid content of fish in different groups A1, A2 and A3 were in the range 3.21(rainy) to 3.89(winter) percent, 3.67(rainy) to 4.36(summer) percent and 3.20(rainy) to 4.47 (summer) percent respectively.

The mean values wherein the range of 50.28(rainy) to 53.58(summer) percent, 53.68(winter) to 59.62(summer) and 50.28 (rainy) to 59.71(winter) in the A1, A2, and A3 respectively. On the basis of age and body weight, more fatty acid was found in the A2 category (54.61 percent) than A3 category. (54.59 percent) and least in the A1 group(54.38 percent).

□ The bodyweight of the carps, raised under summer, rainy and the winter season was 446.81 ± 12.92 , 478.17 ± 14.27 and 478.37 ± 14.62 g, respectively without any significant difference among those. However, as per the sex is concerned in the experimental major carps body weight, total length and the standard length were recorded 469.59 ± 11.75 , 465.97 ± 11.08 ; 35.78 ± 0.32 , 35.79 ± 0.28 ; and 27.50 ± 0.27 , 27.35 ± 0.23 cm respectively, without any visible significant difference.

□ The average length from the head end to the base of dorsal fin(LHF1), length of the area of dorsal fin(LAF1), length from the end of the dorsal fin to caudal peduncle (LF1CP) of all carps under study were recorded as 13.17 ± 0.83 , 6.47 ± 0.05 and 7.80 ± 0.08 cm in Table 22 respectively.

□ Likewise, the corresponding values of LF1CP were 6.20 ± 0.08 , 7.68 ± 0.10 and 9.50 ± 0.13 respectively with the significant difference among them. As per the sex of experimental major carps considered, male and female population shown LHF1, LAF1, and LF1CP were recorded

13.16±0.12, 13.18±0.11 ; 6.47±0.07 , 6.47±0.06 ; 7.81±0.12, 7.79±0.12 respectively with no significant difference among them.

□ The average length of dorsal fin(LF1), length of pectoral fin(LF2), length of pelvic fin(LF3), length of anal fin(LF4), length of caudal fin (LF5) of all carps understudy were recorded as 6.24±0.05, 5.64±0.04, 5.15±0.03, 5.28±0.04 and 8.38±0.05cm respectively

□ The average distance between pectoral fin and pelvic fin (DF2F3), the distance between pelvic and anal fin (DF3F4), the distance between pelvic and caudal fin (DF4F5) and distance between the eye and pectoral fin (DEF2) of all carps under study were recorded as 7.70±0.07cm, 7.02±0.06 cm, 3.54±0.03 cm and 4.31±0.02 cm respectively. However, as per the sex is concerned DF2F3, DF3F4, DF4F5 and DEF2 of male and female carp population are recorded 7.65±0.10 and 7.74±0.09; 7.00±0.08 and 7.04±0.08; 3.53±0.37 and 3.55±0.04; 4.29±0.03 and 4.34±0.03 cm respectively, without any visible significant difference.

□ The average width from dorsal to mid of pectoral fin in cm (WF1MF2), width from dorsal to pelvic fin in cm(WF1F3) and width from dorsal to anal fin in cm (WF1F4) of all carps under study were recorded in Table 25 as 9.84±0.07, 9.87±0.07 and 6.63±0.06 cm respectively. However, as per the sex is concerned WF1MF2, of male and female carp population were recorded 9.87±0.11 and 9.82±0.10; 6.70±0.09 respectively; corresponding values of WF1F3 were 9.86±0.11 and 9.87±0.10 respectively, and corresponding values of WF1F4 were recorded 6.70±0.09 and 6.56±0.07 respectively with no significant difference among them.

□ The average length of the anterior chamber of air-bladder (ABL1), length of the posterior chamber of air bladder cm (ABL2) and weight of air bladder (ABLW) of all carps under study were recorded as 6.0972± 0.057cm, 7.1431±0.086 cm and 3.277±0.08 cm respectively. However, as per the sex is concerned ABL1, ABL2 and ABW of male and female carp the population are recorded 6.207±0.085 and 5.988±0.076 cm; 7.128±0.122 and 7.158±0.123 cm; 3.379±0.125g and 3.175±0.102 g respectively, without any visible significant difference.

□ The average weight of heart, length of stomach, the weight of stomach, the weight of liver, weight of gonads (pair), the weight of kidney of all carps under study were recorded as, 0.46±0.01, 10.13±0.10, 1.81±0.05, 5.18±0.13, 4.96±0.79, 4.96±0.79 and 0.48±0.02

respectively. In different age group of major carps A1, A2, and A3 mean weight of gonads (pair) were recorded as 1.41 ± 0.34 , 3.96 ± 0.87 and 9.49 ± 2.14 g respectively, without any significant difference between summer and rainy season, but there is a significant difference of summer rainy with the winter season. In the present investigation, male and female major carps had shown no significant difference among them in their length of stomach, weight of heart, stomach, liver, and kidney, but gonads (testes) of male (0.020 ± 0.002) and gonads (ovaries) of female ones (9.90 ± 1.53) showed a significant difference.

□ The average biological parameters, conditional factor (K), gastronomic index (GSI), hepatosomatic index (HSI) and gonad somatic index (GnSI) of all carps under study were recorded as 2.18 ± 0.04 , 0.53 ± 0.075 , 1.11 ± 0.08 and 0.99 ± 0.33 respectively. The corresponding values of GnSI and K were 0.98 ± 0.07 , 1.13 ± 0.09 , 1.23 ± 0.22 ; 0.58 ± 0.35 , 1.03 ± 0.74 , 1.34 ± 0.60 with no significant difference among them. As per the sex is concerned K, GSI, HSI and GnSI of male and female carp population is recorded 2.16 ± 0.06 and 2.19 ± 0.07 ; 0.56 ± 0.12 and 0.50 ± 0.10 ; 0.05 ± 0.06 and 1.15 ± 0.15 ; 0.07 ± 0.036 and 1.91 ± 0.62 respectively, without any visible significant difference among them.

Analysis of correlation among male Indian carps showed a significant and positive correlation of body weight with standard length, heart weight, stomach length, stomach weight, liver weight, and kidney weight ranging from the values 0.597 to 0.951 at $p \leq 0.01$ whereas body weight was insignificantly and negatively correlated with gonad(testis) weight ($r = -0.020$ at $p \leq 0.01$). Stomach weight was significantly and positively correlated with the other body parameter such as liver weight ($r = 0.590$ at $p \leq 0.01$), gonad(testis) weight ($r = -0.027$) at $p \leq 0.01$) and kidney weight ($r = 0.463$ at $p \leq 0.01$). Liver weight exhibited a significant and positive correlation with kidney weight ($r = 0.711$ at $p \leq 0.01$) an insignificant and negative correlation with gonad weight ($r = -0.133$ at $p \leq 0.01$). Again gonad weight exhibited an insignificant and negative correlation with gonad weight ($r = -0.080$ at $p \leq 0.01$)

□ Bodyweight with different biological parameters showed significant positive correlation with all other biological parameters such as total length, standard length, heart weight, stomach length, stomach weight, liver weight, gonad(ovary) weight and kidney weight with r value fluctuating from 0.312 to 0.940 at $p \leq 0.01$. Liver weight displayed significant positive correlation

with ovary weight($r=0.227$ at $p\leq 0.01$) and kidney weight ($r=0.037$ at $p\leq 0.01$) but no correlation was found between ovary weight and kidney weight($r=0.037$ at $p\leq 0.01$).

□ Analysis of correlation matrix indicated that body weight showed significant positive correlation with all other biological parameters such as total length, standard length, heart weight, stomach length, stomach weight, liver weight, gonad weight and kidney weight with r value changing from 0.217 to 0.963 at $p\leq 0.01$. Similarly, a strong positive correlation was also observed by the total length with standard length, heart weight, stomach length, stomach weight, liver weight, gonad weight, and kidney weight with r value varying from 0.206 to 0.984 at $p\leq 0.01$. Liver weight displayed a significant positive correlation with kidney weight ($r=0.514$ at $p\leq 0.01$) but no correlation was found with gonad weight($r=0.094$). Moreover, a negative correlation was found between kidney weight and gonad weight.

□ Correlation matrix analysis indicated that body weight showed a significant positive correlation with all other biological parameters such as total length, standard length, heart weight, stomach length, stomach weight, liver weight, gonad weight and kidney weight with r -value ranging from 0.286 to 0.966 at $p\leq 0.0$. Liver weight displayed significant positive correlation gonad weight (0.251 at $p\leq 0.05$) and kidney weight ($r=0.629$ at $p\leq 0.01$) but no correlation was found between gonad weight and kidney weight($r=0.055$). Moreover, no negative correlations among different parameters were encountered during correlation analysis.

□ Correlation analysis among different biochemical parameters of *Catla catla* indicated that body weight resulted in a significant positive correlation with all other biological parameters such as total length, standard length, heart weight, stomach length, stomach weight, liver weight, and kidney weight with r -value ranging between 0.829(heart weight) to 0.939(total length) at $p\leq 0.01$ except gonad weight which showed a positive significant correlation with r value 0.216 at $p\leq 0.05$.

□ Analysis of correlation matrix pointed to the fact that body weight was significantly and positively correlated with all other biological parameters such as total length, standard length, heart weight, stomach length, stomach weight, liver weight, gonad weight and kidney weight with r value varying between 0.301(gonad weight) to 0.942(total length) at $p\leq 0.01$. Heart weight

was also significantly correlated with stomach length($r=0.667$ at $p\leq 0.01$), stomach weight($r=0.521$ at $p\leq 0.01$), liver weight($r=0.674$ at $p\leq 0.01$) and kidney weight ($r=0.516$ at $p\leq 0.01$), but it was negatively correlated with gonad weight($r=0.049$). Stomach length was significantly and positively correlated with stomach weight($r=0.680$ at $p\leq 0.01$), liver weight($r=0.540$ at $p\leq 0.01$) and kidney weight ($r=0.415$ at $p\leq 0.01$) whereas it showed a significant correlation with gonad weight($r=0.133$) at $p\leq 0.05$. Stomach weight also showed a significant correlation with liver weight($r=0.620$ at $p\leq 0.01$) and kidney weight ($r=0.192$ at $p\leq 0.01$) whereas it displayed no significant correlation with gonad weight($r=0.049$). However, liver weight displayed significant positive correlation gonad weight ($r=0.327$ at $p\leq 0.01$) and kidney weight ($r=0.329$ at $p\leq 0.01$) but a negative correlation was found between gonad weight and kidney weight($r=0.024$).

□ Correlation analysis indicated that body weight showed significant positive correlation with all other biological parameters such as total length($r=0.940$ at $p\leq 0.01$), standard length($r=0.909$ at $p\leq 0.01$), heart weight($r=0.862$ at $p\leq 0.01$), stomach length($r=0.812$ at $p\leq 0.01$), stomach weight($r=0.603$ at $p\leq 0.01$), liver weight($r=0.738$ at $p\leq 0.01$) and kidney weight ($r=0.750$ at $p\leq 0.01$) except with gonad weight($r=0.188$) where correlation is positive and significant at $p\leq 0.05$. Liver weight though displayed significant positive correlation kidney weight ($r=0.713$ at $p\leq 0.01$) but no correlation was found with gonad weight($r=0.032$). On the other hand, kidney weight showed a negative correlation with gonad weight($r=-0.006$).

□ Liver weight displayed significant positive correlation gonad weight($r=0.345$ at $p\leq 0.01$) and kidney weight ($r=0.926$ at $p\leq 0.01$). Also, a strong positive correlation was found between gonad weight and kidney weight($r=0.364$ to $p\leq 0.01$).

□ The season-wise percentage analysis revealed that percentage of heart weight to body weight of summer, rainy and winter season was 0.904%, 0.908% and 0.100% respectively with no significant difference between them. The season-wise percentage analysis revealed that the percentage of heart weight to body weight of summer, rainy and winter season were 0.904%, 0.908%, and 0.100% respectively with no significant difference between them. Similarly, species wise analysis of the percentage of heart weight with respect to body weight showed no significant difference among the values of *L.rohita* (0.09%), *C.mrigala* (0.09%) and *C.*

catla (0.100.%) Along with the age, percentage of HW increases from 0.084% of A1 to 0.102% of A2 and 0.10% of A3. The HW percentage BW is slightly higher in female carps (0.096%) than males (0.101%). Likewise, percent of STL to BW was recorded highest in summer season (2.25%) than in rain (2.17%) and winter(2.06%).