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Culture of Tilapia (*Oreochromisniloticus*) and Major Carps Ruhu (*Labeorohita*) andCatla (*Gebelioncatla*)) In the Coastal Area ofKolapara, Patuakhali

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Abstract:*Aquaculture*is the breeding, rearing and harvesting of fish, shellfish, plants, algae, and other organisms in all types of water environments for fulfill the demand of protein. *Coastal aquaculture includes inshore & off shore operations, as well as culture in those ponds near a coast where brackish water culture is also undertaken. The experiment was conducted for a period of 6th month to evaluate the growth and production performance of tilapia (Oreochromisniloticus), ruhu (Labeorohita) and catla (Gebelioncatla)) under different stocking densities in monoculture and polyculture system at Anipara village in KalaparaUpazila, Patuakhali from 20th September 2015 to 20th March 2016. There were three treatments and five replications. The stocking density in T_1 was only tilapia 200/dec, T_2 was tilapia 200/dec, catla 8/dec and ruhu 32/dec and T_3 was tilapia 200/dec, catla 32/dec and ruhu 8/dec respectively. The water quality parameters were as follows: Transparency (cm) ranged 25.71-18.86ft T_1; 23.29-16.57 in T_2; and 26.14-19.00 in T_3, pH ranged 7.4-7.8 in T_1; 7.2-7.6 in T_2; and 7.0-7.4 in T_3 and dissolved oxygen ranged 5.8-6.4mg/l at T_1, 5.4-6.2 mg/l in T_2 and 5.0-6.2 mg/l in T_3. The mean highest final weight of tilapia, ruhu and catla were 0.26517 kg (T_1), 0. 26392 kg (T_2) and 0.24234 kg (T_3), respectively. The contribution of the tilapia was the highest to the total production of fishes. There was highest survival rate tilapia 85.63 %(T_1), ruhu 83.35 % (T_2) and catla 83.97 % (T_2), respectively. The highest weight gain found in tilapia 0.25859 kg (T_1). Among the three treatments the highest production of fish was recorded in T_1 (11.3546 ton/ha) which was subsequently higher followed by the production of T_2 (10.26135 ton/ha) and T_3 (9.03535 ton/ha). In this study the highest production was achieved at the lowest density i.e., 200/dec and 32/dec. The present studyrevealed that tilapia has high growth potential in monoculture system. However, tilapia monoculture is the best suitable culture practice as their production was high. Thus, monoculture of tilapia is suggested to practice in homestead pond.*

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I. Introduction

Especially for the poor in the developing countries, fish and fisheries have been playing an important role in addressing nutritional and livelihood security. Fishery resources and fishing plays a vital role in improving the socio-economic status, the fight against malnutrition, earn foreign exchange and creating employment opportunities in Bangladesh (Mahfuj et al., 2012). Globally, over 2 billion people get at least 20% of their animal protein intake from fish. In industrialized countries, fish provide 13% of animal protein intake, whilst in Asia, it average 30%. In some Asian countries, it could be much higher than the average: 58, 63 and 75% in Indonesia, Bangladesh and Cambodia, respectively (Delgado et al., 2003). Inthe present time the fish production of Bangladesh is decreasing due to many causes. So it is strongly felt that all sorts of the efforts need to be employed to increase the fish production in all available inland water bodies to fulfil the protein demand of the people. Pond fish culture can also become an important element of income generation in rural development programs and is complemented by the production of crops and livestock (Chowdhury and Maharjan, 2001) But instead, the shortage of animal protein can be met through the development of aquaculture, as it not only requires less investment of money compared to livestock and poultry, but can also be produced using a land not suitable for agriculture (Chowdhury and Maharjan, 2001). But it is true that the vast water bodies have yet not been properly utilized for culture due to lack of capital, adequate knowledge and proper technology. There is a considerable scope to increase aquaculture production through technology semi-intensive or intensive system. There is always a demand for fresh fish market, enticing owners of ponds for aquaculture company (Minar*et al*., 2013).So culture system development is one of the most important factors to increase fish production. In these culture practices, both native and exotic species are stocked together, many of them have been found antagonistic to each other (Wahab and Ahmed, 1992). Keeping these views, the research works has been undertaken with the objectives to demonstrative best management practices of tilapia with ruhu and catla to

increase the present production level. Considering of all the above facts the main objectives of the study were as follows:

- To assess the production performance of fishes in the homestead pond of project beneficiary.
- To evaluate the growth performance of fishes.

II. Materials And Methods

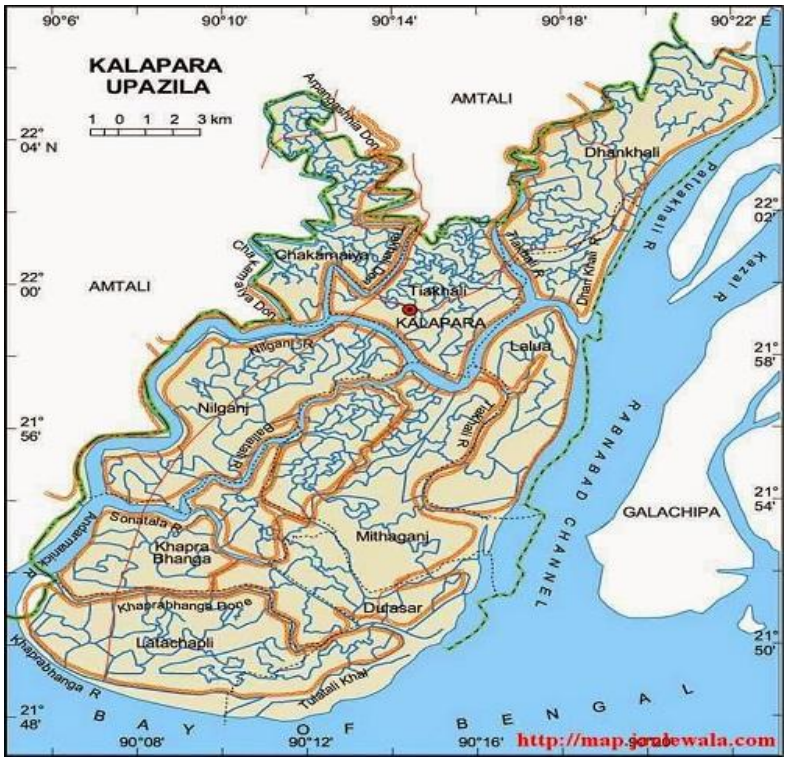

Fig: Map showing the study area of kalapara, Patuakhali.

2.1 Study area: The present study was conducted in farmer's ponds under semi-intensive rearing system in KalaparaUpazila under Patuakhali district. The experiment was conducted for a period of 180 days for tilapia (*Oreochromisniloticus*) and major carp ruhu*(Labeorohita*) and catla (*Gebelioncatla)* from 20 September 2015 to 20 March, 2016, in 15 homestead ponds at Anipara village in KalaparaUpazila. The average size of the experimental ponds were 10±2 decimal having a depth of 1.10±0.12m. The experiment was conducted in five replications under three treatments to evaluate the growth performance of tilapia (Oreochromisniloticus), ruhu (Labeorohita) and catla (Gebelioncatla) under different stocking densities in polyculture and monoculture system. This study was conducted by following well planned and consecutives steps which was discussed in below:

2.2. Experimental design: Three treatments having different density of tilapia, ruhu, catla were tested in this experiment. Each treatment had five replications and assigned into a completely random design.
Table 1: Experimental layout of ruhu and catla with tilapia culture

Species	Number of pond=5	Number of pond=5	Number of pond=5
	T_1	T_2	T_3
Tilapia/dec	200	200	200
Ruhu/dec	-	32	8
Catla/dec	-	8	32
	Only Tilapia	Tilapia and Carps	Tilapia and Carps

2.3 Pond preparation: The following techniques were used for pond preparation:

2.2.1 Pond drying: Prior to the start of experiment, all ponds were completely dried for two weeks from 6th August to 21st August, 2015.

2.2.2 Excavation: After drying, all ponds were re-excavated for removing the bottom mud during 22nd August to 29th August, 2015.

2.2.3 Liming: After renovation, liming was done at a standard rate of 1kg/dec on 30th August, 2015. Lime was mixed with water and kept overnight. Then the liming was distributed on the pond surface early in the morning.

2.2.4Water supply: After 5-7 days of liming, the ponds were filled in with water from the adjacent near able sources from 6th September to 10th September, 2015.

2.2.5Fertilization: Then, 3days later of supply water, the fertilizer was done at a standard rate of 240g Urea & 116g TSP per decimal on 13th September, 2015. The require quantity of fertilizers was dissolved in sufficient quantity of water and after storing for 24 hours, the fertilizer emulsion was sprinkled evenly over water of the pond.

2.4. Fingerlings Collection: Fingerlings are one of the factors that have a direct effect on the quality of fish. After 7 days, the tilapia was collected from reliable sources. Fingerlings of carps (ruhu and catla) were collected from a reputed hatchery preferably located at nearby places of 20th September 2015. Both the tilapia fry and carp fingerlings were carried in oxygenated poly bags from hatchery gate to experimental site. Qualities of fingerlings were ensured before stocking.

2.4.1 Sampling of Fishes: After collection of fingerlings, the sampling was done as the same time of 20th September, 2015 by using digital balance. Then the average weight of tilapia, ruhu and catla were 6.576g, 22.09g and 6.305g respectively.

2.5 Stocking: After completing of sampling, 20th September, 2015 the fingerlings were stocking in the research ponds. T_1: tilapia at density 200 per decimal; T_2: tilapia at density 200per decimal and ruhu 32 and catla 8 per decimal and T_3: tilapia at density 200per decimal and ruhu 8 and catla 32 per decimal.

2.6Feeding Regimes: Formulated floating feed was purchased from the Kalapara local market. The feeds were given initially at 10% of body weight/day from 22th September, 2015 and reduce to 3% according to the body weight.

2.7 Fertilization: After the stocking of fishes, the fertilizer was applied at a standard rate of 240g Urea and 116g TSP per decimal at the fifteen days interval.

2.8 Water quality monitoring: Throughout the experimental period, the water quality parameters were recorded monthly. Water quality measurements were done between 9.00am and 11.00 am on each sampling day. Water temperature (°C), transparency (cm), pH and dissolved oxygen (mg l-1) were measured on the spot.

2.8.1 Methods used for water quality analysis: The following techniques were used for water quality analysis:

2.8.1.1 Measurement of physical factors: The physical factors (transparency) were determined by the following methods:

2.8.1.1.1 Transparency (cm): The transparency of water was measured on the spot by using a Secchi disc of 20 cm diameter. First, the Secchi disc was pierced into the water to the view of naked eye and then the length that was under the water was recorded in cm by a measuring scale at the ponds.

2.8.1.2 Methods of chemical analysis: The chemical factors were determined by the following methods:

3.8.1.2.1 pH (Hydrogen ion concentration):pH of pond water was determined by using a direct reading digital pH meter (ECOFISH-15-0042, Model: M-ACS006G/C) on the spot.

2.8.1.2.2 Dissolved oxygen (mg l-1): The dissolved oxygen concentration of water was measured by using a portable multi-parameter sensor (ECOFISH-16-0043, Model: M-ACS007G/C).) on the spot.
2.9 Sampling of fishes: Monthly sampling was done by using a seine net to monitor the growth of tilapia, ruhu and catla to adjust the feeding rate. Fifty tilapia (50), twenty (20) ruhu and twenty (20) catla were taken from each pond separately for rough assessment of growth trends. The weight of tilapia, ruhu and catla were

measured by using an electric balance. General pond conditions and fish health were monitored regularly during the experimental period. The sampled fishes were handled carefully to avoid handling stress.

2.10 Harvesting: After 180 days of culture periods, all fishes were harvested on 23th March, 2016. Primarily, the partial harvesting of fishes was performed by repeated netting and a seine net. Final harvesting was done by using pond drying. During the harvesting period, all fishes of each pond were collected, counted and weighted individually to assess the survival rate and pond production.

2.11 Analysis of Growth Parameters: To evaluate the fish growth and production, some parameters were used such as weight gain (g), survival rate (%), SGR (%/day) and FCR.

2.11.1 Weight gain (g): Weight gain of fish was calculated by the following formula:
Weight gain (g) = Mean final weight (g) – Mean initial weight (g)

2.11.2 Survival rate (%)
Survival rate of fish was calculated by the following formula:
No. of fishes harvested Survival rate (%)
= ---------- × 100
No. of fishes stocked

2.11.3 SGR (Specific Growth Rate)
SGR (%/day) of fish was calculated by the following formula: $= (\ln W_2 - \ln W_1 x100) / t$

3.11.4 FCR (Feed Conversion Ratio)
FCR of fish was calculated by the following formula:
Total feed used (kg)
FCR = ----------
Total weight gain (kg)

2.11.5 Production (kg/ha/6 months): At the end of the experiment, most of the fishes were caught by net and the rest by draining out the ponds. It was calculated as:
Fish yield (kg/ha/6 months) = Fish biomass at harvest – Fish biomass at stock

2.12 Statistical Analysis: For the statistical analysis of the data, a one-way ANOVA (Analysis of Variance) was done by using the SPSS (Statistical Package for Social Science) version- 16.0 to identify significance difference among total production in different treatments. Significance was assigned at the 0.05% level.

III. Results

3.1 Water Quality Parameters (±SD)

Water quality parameters play an important role in the growth and development of aquatic organisms. The maintenance of good quality water is essential for cultured organisms. Success of aquaculture depends almost completely on the quality of different water parameters. The sudden fluctuation of water quality parameters may create unfavorable condition in culture system.The result of the water quality parameters such as temperature (°C), dissolved oxygen (mg/l) and pH were recorded monthly during the experimental period is shown in Table 2.

Parameters	**Anipara Village**		
	T1(mean±SD)	**T2(mean±SD)**	**T3(mean±SD)**
Dissolved Oxygen (mg/l)	5.43±0.36	4.64±0.56	4.72±0.41
pH	7.22±0.26	6.90±0.46	7.12±0.18
Transparency (cm)	22.49±1.42	19.73±2.17	22.80±0.98

Table: Water Quality Parameters during study period (mean and range)

3.1.1 Physical Parameters
3.1.1.1 Transparency (cm)

Water transparency varied in different ponds under the treatments. The transparency ranged from 20 to 38 cm. The mean values of water transparency of the treatments T_1, T_2, and T_3 were 22.49 cm, 19.73 cm and 22.80 cm respectively during study period. The water transparency values of different treatments during the study period varied between 17.40 to 29.00. The significantly highest pH value (29.00) was recorded on 19th

March at (T_1) and lowest (17.40) was recorded on 14th October at (T_2). A graphical presentation of the transparency found in different treatments during the study period has been shown in Fig.

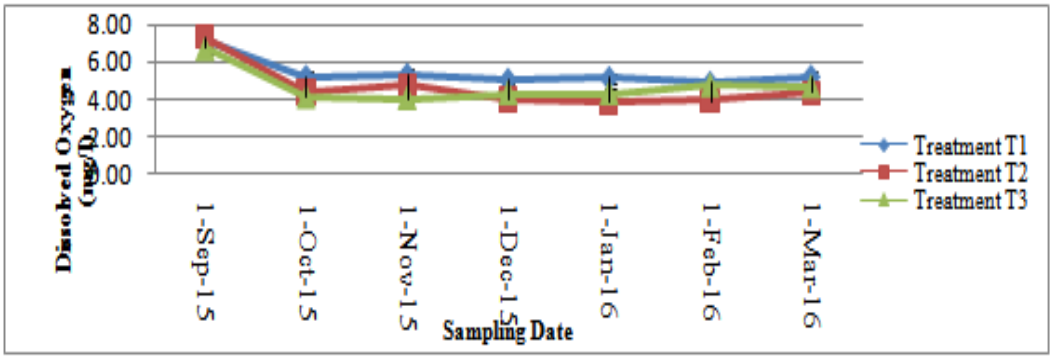

Fig: Monthly variation of Transparency (cm) under different treatments throughout the study period

3.1.2 Chemical Parameters

3.1.2.1 Dissolved oxygen (mg/l): The mean Dissolved Oxygen (mg/l) contents were 5.43, 4.64 and 4.72 inT_1, T_2 and T_3respectively. The lowest value of DO was found in T_2 (3.83 mg/L) during the month of September. The highest average value of dissolved oxygen 7.30 (mg/l) was found in T_2 during the month of June that was possibly due to less organic decomposition of supplied feed. The dissolved oxygen of water was determined by using a portable digital DO meter (DO 5509, AF. 11581, made in Taiwan) on the spot. A graphical presentation of the Dissolved Oxygenfound in different treatments during the study period has been shown in Figure.

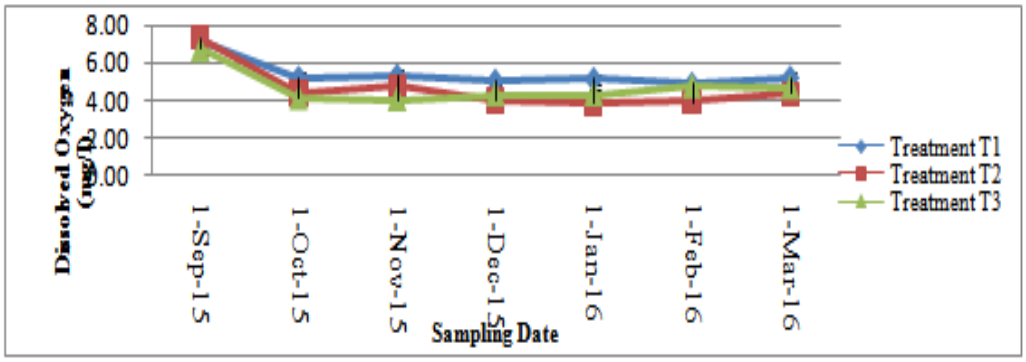

Fig: Monthly variation of Dissolved oxygen (mg/l) under different treatments throughout the study period

3.1.2.2 PH: Water pH was measured by a direct reading digital pH meter (HANNA Instruments, HI 96107, made in Italy) on the spot. The mean values of pH were 7.22, 6.90 and 7.12 in ponds of T_1, T_2 and T_3respectively, which indicate good productive conditions.). The significantly highest pH value (7.86) was recorded on 13th September at (T_1) and lowest (6.38) was recorded on 18th February at (T_2). A graphical presentation of the pH found in different treatments during the study period has been shown in Fig.

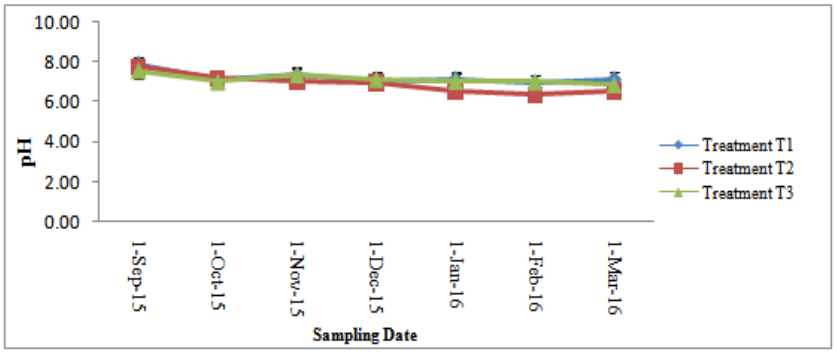

Fig: Monthly variation of pH under different treatments throughout the study period.

4.2 Growth performance of fish

Growth performance of Tilapia, Ruhu and Catla in term of weight (g) gain under different treatments for a period of 180 days is presented in the Tables 3. For the evaluation of growth performance of Tilapia, Ruhu and Catla in three treatments in terms of final weight (g) gain, mean weight (g) gain, average daily weight gain (g), percent weight gain (g), specific growth rate (SGR% per day), food conversion ratio (FCR), Benefit Cost Ratio, production (Kg/ha/treatment) and survival rate were calculated. At the beginning of the experiment the initial weight of tilapia, Ruhu and catla was 6.58g, 22.09g and 6.31g which are showed in below.

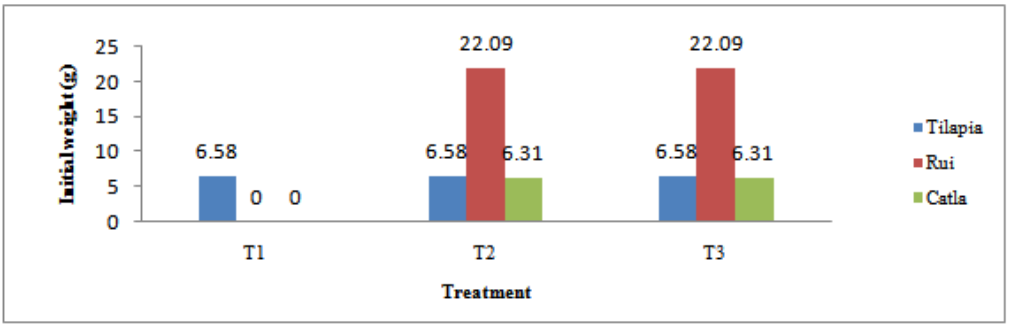

Fig: Initial Weight gain (g) of Tilapia, Ruhu and Catlain different treatments through the studyperiod

4.2.1 Final weight: Mean final weight of tilapia varied significantly among the treatments. The mean final weight of tilapia in treatment T_1 (265.17g) was significantly higher than the others treatments T_2 (199.55g) and T_3 (179g) shown in table 4. Tilapia rohu and Catla were stocked at different ratio in treatment T_1, T_2 and T_3 respectively. The mean final weight of Tilapia, Ruhu and catla were 265.17g, 0.00g, 0.00g in T1, 199.55g, 263.02g, 151.61g in T2 and 179.54g, 245.62, 242.34g in T_3 respectively.

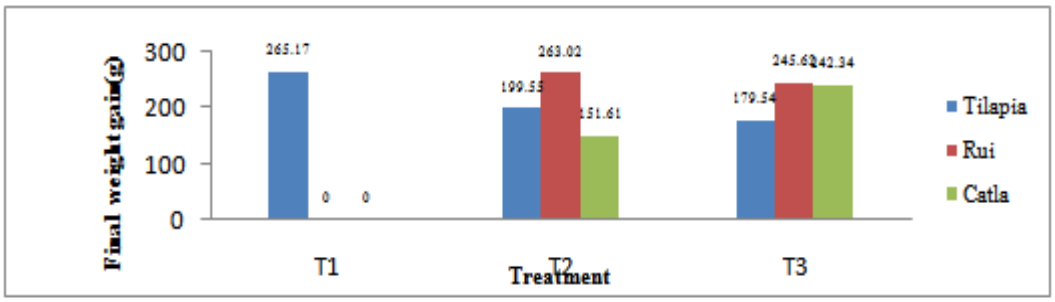

Fig: Final Weight gain (g) of Tilapia, Ruhu and Catlain different treatments through the study period.

4.2.2 Weight gain (g)

Weight gain of all the fish species varied considerably among the treatments. The mean weight gain of tilapia was significantly higher in T_1 (258.59g) than other treatments T_2 (192.97g) and T_3 (172.96g) shown in table 3. The mean weight of Tilapia, Ruhu and Catla were 258.59g, 0.00g, 0.00g in T_1, 192.97g,240.93g,145.31g in T_2 and 172.96g, 223.53g,236.03g in T_3 respectively (Table 3). Comparatively weight gain in different treatment shown in (Fig3). In T_2Ruhu growth was high in other two species but in T_3Catla was high thaRuhu and Catla Monthly average growth of different fishes in different treatments was shown in (Fig 3).

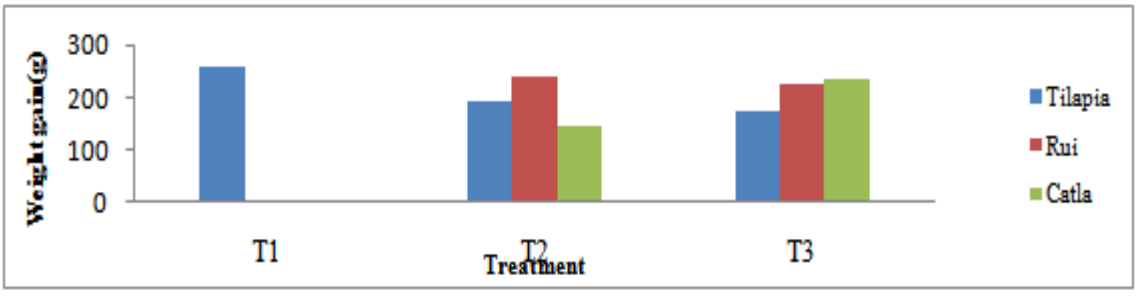

Fig:Weight gain (g) of Tilapia, Ruhu and Catlain different treatments through the study period

3.2.3 Average daily weight gain (g): Average daily weight gain of Tilapia, Ruhu and Catla at the end of the experiment were 1.44g, 0.00g, 0.00g in T1, 1.07g,1.34g,0.45g in T_2 and 0.96g, 1.24g, 0.40g in T_3 respectively (Figure 7). Average weight gain in Tilapia in T_2 and Ruhu in T_2 were significantly different.

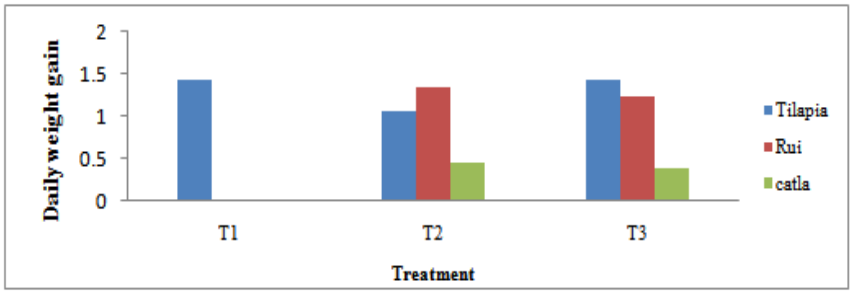

Fig: Average daily weight gain (g) of Tilapia, Ruhu and Catlain different treatments throughout the study period.

4.2.5 Specific growth rate (% per day):
During the investigation of specific growth rate (SGR) in T_1 of Tilapia was 2.04%. SGR in T_2 of Tilapia, Ruhu and Catla were 1.88%, 1.48% and 1.3%. Whereas, in T_3 of Tilapia, Ruhu and Catla the values were 1.82%, 1.33% and 0.09 respectively (Tables 3 and Figure 9). SGR values were significantly (P<0.001) different in T_1, T_2 and T_3 in Catla.

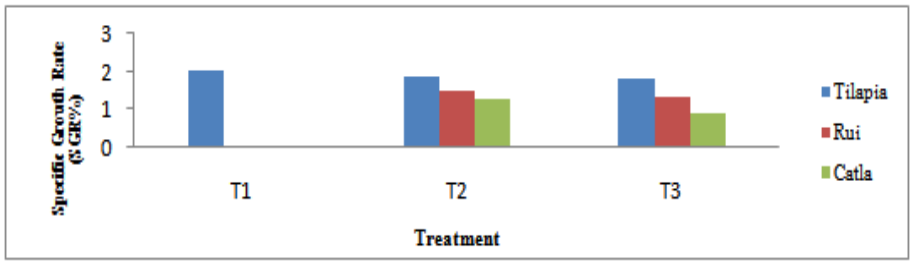

Fig: Specific growth rate (% per day)of Tilapia, Ruhu and Catlain different treatments through the study period.

4.2.6 Survival rate (%): The survivals rates of fish at the end of the experiment were 85.63 in Tilapia in T_1. In T_2 Tilapia, Ruhu and Catla were 82.8, 83.35 and 83.97 in T_2 and the survival rate of Tilapia, Ruhu and Catla were 79.42, 79.29 and 78.31 in T_3 respectively. Significantly highest survival rate was obtained in Tilapia in T_1 (85.3.63%) and lowest was in Tilapia in T_3 (79.42%).

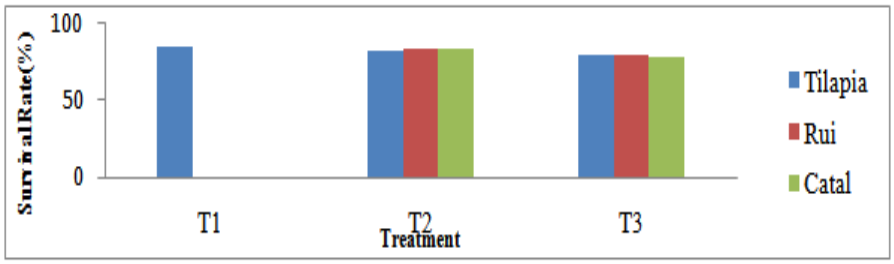

Fig: Survival rate (%) of Tilapia, Ruhu and Catlain different treatments through the studyperiod.

4.2.7 Food conversion ratio (FCR): The mean values of FCR for Tilapia in T_1, T_2 and T_3 were 0.10, 0.15 and 0.20 respectively. In Ruhu the mean values of FCR in T_1, T_2 and T_3 were 0.00, 0.20 and 0.36 respectively and Catla the mean values of FCR in T_1, T_2 and T_3 were 0.00, 0.31and 0.42 respectively There was significant (P<0.001) differences in FCR of fish among the treatments.

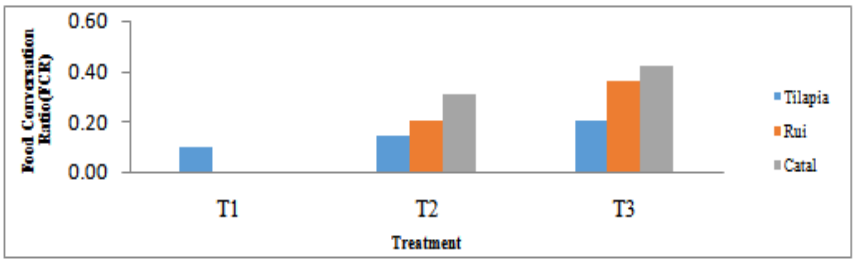

Fig: Food conversion ratio (FCR) of Tilapia, Ruhu and Catlain different treatments through the study period.

4.2.9 Fish production: Production of Tilapia in T_1, T_2 and T_3 were 11354.06 kg/ha, 8260.45kg/ha and 7133.03kg/ha whereas, production of Ruhu in T_2 and T_3 were 1748.48 kg/ha and 252.42 kg/ha respectively (Tables 3 and Figure 13). Production of T_3 of both the species were 7133.03, 388.58 and 1513.74 significantly high ($p<0.05$) and production of T_1 of both the species were significantly low ($p<0.05$).

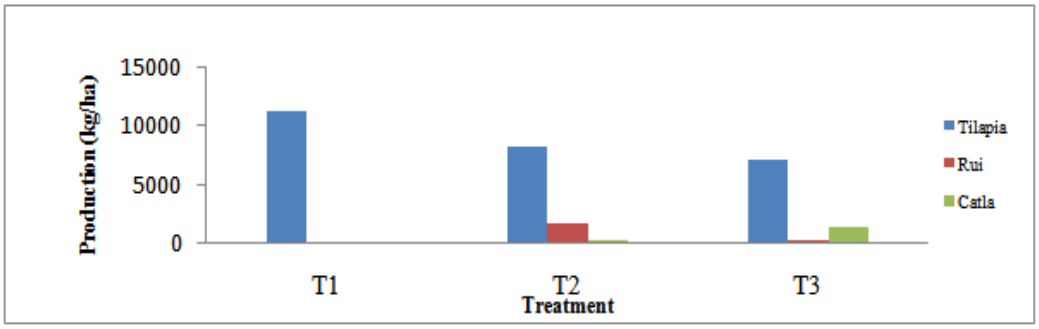

Fig: Fish production (kg/ha)of)of Tilapia, Ruhu and Catlain different treatments through the study period.

3.2.4 Percent weight gain: The percent weight gain of Tilapia till the end of the experiment were 3932.38, 2934.5 and 6185.1 in T_1, T_2 and T_3 respectively (Tables 3) and in Ruhu were percent weight gain. In Ruhu the percent weight gain were 1090.65 and 1011.92 in T_2 and T_3 respectively and in catla the percent weight gain were 1231.84 and 1142.07 which were also significantly different ($p<0.001$).

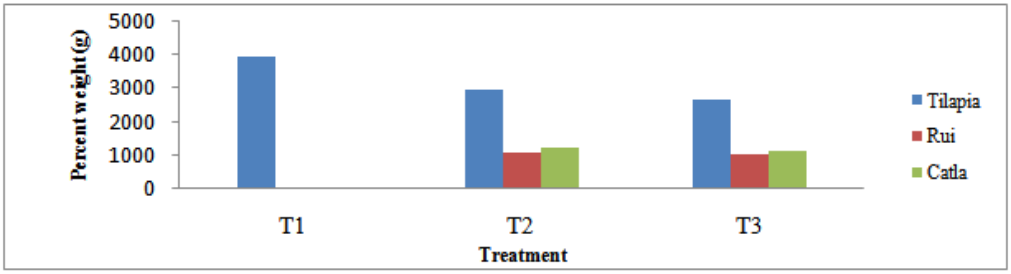

Fig.: Percent weight gain (g) of tilapia, ruhu and catla in different treatments throughout the study period.

Table 3: Growth performance and production of Tilapia, Ruhu&Catla in polyculture observed during the experimental period.

Growth performance		**Treatment**			Level of Significance
	Name	T_1	T_2	T_3	
Initial weight (g)	Tilapia	6.58±2.59	6.58±2.60	6.58±2.61	0.220
	Ruhu	22.09±6.55	22.09±6.55	22.09±6.55	0.220
	Catla	0.00	6.31±1.44	6.31±1.44	0.220
Final weight (g)	Tilapia	265.17±41.95	199.55±58.82	179.54±52.04	0.189
	Ruhu	0.00	263.02±111.74	245.62±54.51	0.762
	Catla	0.00	151.61±82.63	242.34±148.60	0.267
	Tilapia	258.59±41.95	192.97±58.82	172.96±52.04	0.053

Weight gain (g)	Ruhu	0.00	240.93±111.74	223.53±54.51	0.762
	Catla	0.00	145.31±82.63	236.03±148.60	0.267
Percent weight gain (g)	Tilapia	3932.38±637.96	2934.5±894.48	2630.21±791.32	0.053
	Ruhu	0.00	1090.65±505.85	1011.92±246.76	0.762
	Catla	0.00	1231.84±30.97	1142.07±23.46	0.001**
Daily weight gain	Tilapia	1.44±0.23	1.07±0.34	0.96±0.48	0.053
	Ruhu	0.00	1.34±0.62	1.24±0.30	0.762
	Catla	0.00	0.45±0.01	0.40±0.01	0.001**
SGR (%)	Tilapia	2.04±0.12	1.88±0.18	1.82±0.13	0.060
	Ruhu	0.00	1.48±0.26	1.33±0.11	0.060
	Catla	0.00	1.30±0.01	0.09±0.01	0.001**
FCR	Tilapia	0.10±0.01	0.15±0.01	0.20±0.01	0.182
	Ruhu	0.00	0.20±0.03	0.36±0.05	0.000***
	Catla	0.00	0.31±0.32	0.42±0.15	0.008*
Survival rate (%)	Tilapia	85.63±011	82.80±0.27	79.42±0.34	0.008*
	Ruhu	0.00	83.35±0.99	79.29±3.30	0.030*
	Catla	0.00	83.97±1.95	78.31±1.48	0.001**
Production (Kg/ha)	Tilapia	11354.06±1801.13	8260.45±2435.77	7133.03±2088.57	0.023*
	Ruhu	0.00	1748.48±730.78	388.58±84.09	0.003*
	Catla	0.00	252.42±133.03	1513.74±908.02	0.015**

P<0.05, *; P<0.02, **; P< 0.001, ***

IV. Discussion

4.1 Dissolved oxygen: During the experimental period dissolved oxygen content of the ponds were found between 4.64 to 5.43 mg/L. Ahmed *et al.* (2012) measured dissolved oxygen ranged from 6 to 8.5 mg/L. Chakma (2011) found dissolved oxygen varied from 3.50 to 14.00 mg/L in six experimental ponds which were much lower and higher than the required dissolved oxygen for fish culture. From the above discussion, it may be concluded that the dissolved oxygen content of the experimental ponds were within the good productive range.

4.1.2 pH:. In the study, the mean value of water pH in different treatments varied between 6.90 to 7.22. Ahmed *et al.* (2012) found pH range from 6.5 to 8.5. Chakma (2011) recorded pH range between 7.44 and 7.66. Ahmed *et al.* (2013) also measured pH from their experimental ponds which were ranged from 7.10 to 8.00. Akter*et al.* (2009) recorded pH 7.15 to 7.60 in Kailla oxbow Lake of Mymensingh from summer to winter season. Most natural water had pH values ranged from 6.5 to 8.5 (Nirod, 1997). The present findings were within acceptable range (6.5 to 8.5) required for fish culture (DoF, 1996).

4.1.3 Transparency (cm): The values of water transparency were noted to vary from 19.73 to 22.80 cm. The present findings agreed with the findings of Rahman(2000) and Islam(2007) who recorded transparency values ranged from 12to 41cm and 25.60-32.6 cm respectively on tilapia (Oreochromisniloticus) culture at the field laboratory ponds situated behind the Bangladesh Agricultural University (BAU), Mymensingh. The ponds were newly made, so the water was slightly turbid.

4.1.4 Growth performance of fish: The growth performance of different species of fish viz., Tilapia, Ruhu and Catla in terms of initial weight, final weight, weight gain, specific growth rate (SGR% per day), survival rate and total production are shown below

4.2.1 Weight gain (g): Weight gain of tilapia, Ruhu and Catla were 258.59g, 0.00g, and 0.00g in T_1, 192.97g, 240.93g, 145.31g in T_2 and 172.96 g, 223.53g, 236.03g in T_3. During the study period Tilapia show high weight gain in T_1 than that of T_2& T_3. The weight gain of Ruhu was high T_2 than that of T_1& T_3 and catla was high T_3 than that of T_1& T_1.Azad MAK (2008) reported theWeight gain (g) of tilapia Ruhu and Catla were 89.18g and 30.61 g in T_1, 63.95g and 37.24g in T_2 and 70.84 and 47.65 g in T_3 respectively 100 fish/decimal. According to the result of our investigation, the estimated values of weight gain were within this range.

4.2.2 Specific growth rate (% per day): The Specific growth rate of Tilapia, Ruhu and Catla were 3.07%, 0.00%, 0.00% in $T_1$and 2.81%, 2.00%, 2.16% in T_2 and 2.73%, 1.99%, 2.10% in T_3 respectively. During the present study, treatment T_2 showed better performance in terms of weight (g) than that of T_1 and T_3 for tilapia and Catla.Azad MAK (2004) reported theTilapia showed the second highest (3.65) SGR (% per day) than carps 2.74 SGR (%per day). According to Chakma (2011) the SGR values of fish were ranged from 0.94% to 1.13%. On the other hand Akter (2010) mentioned the SGR values were 2.54%, 2.44% and 2.39% the estimated values of SGR were within this range.

4.2.3 FCR: The FCR of Tilapia, Ruhu and Catla were 0.02, 0.00, 0.00 in T1, 0.03, 0.14, 1.05 in T_2 and 0.03, 0.06, 0.02 in T_3 respectively. During the present study treatment T_1 showed better performance than that of T_2 and T_3.According to Sayeed*et al.* (2008) showed that in T_1, T_2 and $T_3$the Feed conversion ratio (FCR) was 2.3, 2.1 and 1.96 respectively. The estimated values of SGR were within this range.

4.2.4 Survival rate (%): The survivals rates of fish at the end of the experiment were Tilapia, RuhuCatla in 85.63, 0.00, and 0.00 in T_1, 82.80, 83.35, 83.97 in T_2 and 79.42, 79.29, 78.31 in T_3 respectively. Significantly higher survival rate was obtained in Tilapia in T_1 (85.63%) and lowest was in Catla in T_3 (78.31%). Azad MAK (2004) reported thesurvival rate of Tilapia and Carps were 92.45, 90.76, 91.26 and 87.87, 88.56, 88.85 in T_1, T_2 and T_3 respectively. According to Sayeed*et al.* (2008) the survival rates of polyculture were 94 to 97% in nine earthen ponds with a period of 11 months in Batiaghata, Khulna. According to the result of our investigation, the estimated values of survival rate were within this ringed.

4.2.5. Production (kg/ha): Production of Tilapia, Ruhu and Catla were 11354.06 kg/ha, 0.00 kg/h, 0.00 kg/ha in T_1, 8260.45kg/ha, 1748kg/ha, 252.42kg/ha in T_2 and 7133.03kg/ha,388.58kg/ha, 1513.74kg/ha in T_3 respectively. The highest production was Tilapia (11354.06 kg/ha) in T2 and lowest production was Catla (252.42kg/ha) in T_2. According to Azad MAK (2004) reported theproduction of tilapia was found in T_1, T_2 and T_3 were 28.88, 18.89 and 19.39 kg/treatment/90 days. In Tilapia, the highest production was found in T_3 (3.16 kg/treatment/90 days) where in T_1 and T_2 the production was 0.67 and 1.64 kg/treatment/90 days. Jhingran (1976),Chaudhuri (1978), Mathew *et al* (1988). and Gupta *et al* (1990)also reported good results from the polyculture of Indian carps with exotic species and the yield recorded by them were 7000-9000, 7444.8, 10183 and 4917 kg/ha/year, respectively.

V. Conclusion

Growth and production of tilapia was better in T_1 than the other treatments. This might be due to the fact, that in T_2 they properly utilized both natural and artificial feed and successfully compete with other species for food and space. Tilapia was experimentally introduced in this study to observe the growth and production compare with Ruhu and catla. But the production of Ruhu was lower than tilapia but higher in catla. One the other hand the production of catla was comparatively lower the others. This condition was occurred due to compete with other species for food and space. The verification was occurred because the experiment was conducted in the beginning of winter season and end in the begging of summer season. Therefore, polyculture of tilapia with Ruhu and catla is suggested.

Reference

[1]. Mahfuj M S E, Hossain M B, and Minar M H (2012), "Biochemical Composition of an Endangered Fish, Labeobata (Hamilton, 1822) from Bangladesh Waters", American Journal of Food Technology. ISSN: 15574571/ DOI: 10.3923/ajft

[2]. Delgado, C. L., N. Wada, M. W. Rosengrant, S.Meijer and M. Ahmed 2003. Fish to 2020: Supply and demand in changing global markets. World Fish Centre Technical Report, 62. Washington DC: International Food Policy Research Institute

[3]. Chowdhury M H and Maharjan K L (2001), "Increasing Efficiently of Pond Fish Production in Rural Bangladesh. In:Microbehavior and Macroresults", Proceedings of the Tenth Biennial Conference of the International Institute of Fisheries Economics and Trade, July 1014, 2000, Corvallis, Oregon, USA. Compiled by Richard S. Johnston and Ann L. Shriver. International Institute of Fisheries Economics and Trade (IIFET), Corvallis.

[4]. Minar M H, Hossain M B, and Shamsuddin M (2013), "Climate Change and Coastal Zone of Bangladesh: Vulnerability, Resilience and Adaptability", Middle-East Journal of Scientific Research, Vol. 13, No. 1, pp. 114-120, ISSN 1990-9233. DOI: 10.5829/idosi.mejsr.2013.13.1.64121, IDOSI Publications

[5]. Wahab, M.A. and Z.F. Ahmed, 1992: Effect of planktivorous carp species combination on food organisms and electivity indices in the fish ponds. *Progress.Agric*, 2: 21-30.

[6]. Ahmed GU, Khatun T, Hossain MB, Samsuddin M 2012: Health condition of a farmed tilapia (*oreochromisniloticus*) in earthen ponds, Northern Bangladesh. *Bangladesh Journal of Fisheries* **12** 287-293.

[7]. Chakma A 2011: Growth performance of Thai pangus (*Pangasianodonhypophthalmus*) using prepared and commercial feed, MS Thesis,Department of Aquaculture, Bangladesh Agricultural University,Mymensingh.

[8]. Ahmed GU, Sultana N, Shamsuddin M, Hossain MB 2013: Growth and Production Performance of Monosex Tilapia (*Oreochromisniloticus*) Fed with Homemade Feed in Earthen Mini Ponds. *Pakistan Journal of BiologicalSciences***2013** 1-5.

[9]. Akhter, M.M., 2009: Farming System and Economic Analysis of Carp Production in Rural Bangladesh, MS Thesis, Department of Aquaculture, Bangladesh Agricultural University, Mymensingh. Nirod, D. B. 1997: Effects of stocking density on the growth and production of mola*(Amhlypharigodonmola*). M. S. dissertation. Department of Fisheries Management, BAU. Mymensingh, 75 pp.

[10]. DoF 1996: MatshaPakkaShankalan (Bengali) 1996. Department of Fisheries, Ministry of Fisheries and Livestock, People's Republic of Bangladesh.pp. 81.

[11]. Rahman MM 2000: Effects of addition of calbaush (*Labeocalbasu*) in the periphyton based Aquaculture system of rohu and catla, MS dissertation, Department of Fisheries Management, Bangladesh Agricultural University, Mymensingh.

[12]. Islam, S.N., 2007: Physico-chemical condition and occurrence of some zooplankton in a pond of Rajshahi University. Bangladesh Journal of Fisheries Research 24 (2) 21-25.

[13]. Azad, M.A.K., Rahman, MR., Rahman, Z., Kader, MA.,Haque, MM. and Alam, MJ., 2004: Polyculture of Carp, Tilapia and Pangas Using Low Cost Inputs, Pakistan Journal of Biological Sciences .7 (11): 1918-1926.

[14]. Akter, R., 2010: Culture potential of climbing perch Anabas testudineus (Bloch) under different stocking density in BFRI research ponds, MS Thesis, Department of Aquaculture, Bangladesh Agricultural University, Mymensingh.
[15]. Sayeed, M.A.B., Hossain, G.S., Mistry, S.K.andHuq, K.A., 2008: Growth performance of Thai pangus (Pangasiushypophthalmus) in polyculture system using different supplementary feeds. Rajshahi Univ. J. Zool. 27 5962.
[16]. Jhingran, V.G., 1976: System of polyculture in inland waters in India. J. Fish.Res. Board can., 33: 905-910.
[17]. Chaudhuri, P.L., Rao N.G.S., Saha. G.N., Rout, M. and Ranaujia, D.R., 1978: Record fish production through intensive fish culture in a farmer's pond. J. Inland Fish. Soc. India, 10: 19-27.
[18]. Mathew, P.M., Singh, B.K. and Chakrabarty, D.P., 1988: A case study on stocking of fry in six species composite fish culture. J. Maharashtra Agriculture. University 13: 79-82.
[19]. Gupta, V.K., Sharma, J.P. and Snvastava, J.B., 1990: Polyculture of Indian and exotic carps using cattle manurer with and without supplementary feed. Inland Fish. Res. Inst, pp: 430-446.

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