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PRELIMINARY STUDY ON THE GROWTH PERFORMANCE OF NILE TILAPIA (*Oreochromis niloticus*) IN BIOFLOC FISH FARMING

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Abstract

Globally, Nile tilapia (*Oreochromis niloticus*) is one of the most farmed fish. This trial was conducted at IAAS, Paklihawa Campus, Bhairahawa, Nepal from 6th July, 2022 - 31st Sept. 2022 (90 days). Fifteen circular polytank of 500 liter water capacity were used with stocking density of 50 fish (0.5 m^3). Continuous aeration was supplied by 1 Hp ring blower. Carbon to nitrogen ratio was maintained at 10:1. Completely Randomized Design with 5 treatments and each replicated thrice. T1-without floc; control, T2-with floc sugar, T3-with floc corn flour, T4-with floc rice bran and T5-with floc molasses. Mono-sex tilapia with an initial average weight of 4.05±0.44 g were stocked in each tank and 25% CP pellet feed was given twice daily at 3% of body weight. Water quality parameters were significantly different ($p<0.05$) among other treatments except TDS. There was no significantly different ($p<0.05$) among the treatments in temperature, DO, pH and NH3. Similarly, FMW, DWG of tilapia were significantly ($p<0.05$) different among the treatments. The highest DWG was found in T5 (0.40±0.01 g $fish^{-1}d^{-1}$) and the lowest was found in T1 (0.18±0.01 g $fish^{-1}d^{-1}$). FCR was found better in T4 with 0.96±0.04 and least was recorded in T1 with 1.28±0.10. GFY in T5 (3.9±0.07 kg $tank^{-1}$) was significantly higher ($p<0.05$) than T2, T3, T4 and T1 respectively. Similarly, T5 (3.51±0.09 kg m^3) was also significantly higher ($p<0.05$) in extrapolated NFY than other treatments. From the study, T5 was found best for the growth performance and water quality improvement in biofloc system.

Keywords: *Biofloc Technology, Tilapia, C/N Ratio, Probiotics, Carbon Source*

INTRODUCTION

Nile tilapia (*Oreochromis niloticus*) is main freshwater fish species inhabiting in shallow streams, ponds, rivers and lakes. The popularity of tilapia came about due to its low price, easy preparation and mild taste. It has mild flavor and health benefits, low in calories and fat and high in protein. The most popular product form is skinless and boneless fillets (Seafood Health Facts, 2011). Beyond the taste, its farming practices have caused it popularity. It is nicknamed as "aquatic-chicken" which can be produced on a mass scale, allowing the fish to be widely available at a high quality and an affordable price. It is a globally significant aquaculture species rapidly gaining status as a farmed commodity (Lind *et.al*. 2019). Tilapia is a hardy, fast growing fish and that can live up to ten years and reach ten pounds in weight. Nile tilapia is popular due to its superior growth rates and ability to grow to large sizes over a wide range of environmental parameters. Its disease resistance and ability to efficiently utilize very diverse food sources also make it an ideal candidate for culture. Increased production in tilapia has been based on extensive research efforts, with the most significant gains achieved by advancement of monosex production techniques.

Monosex Tilapia based Aquaculture is an ecologically sustainable and profitable venture in South-East Asia and beyond the world.

Biofloc technology is a water quality management technique which is based on the development and controlling of heterotrophic bacteria within the culture system with minimal or zero water exchange (Ekasari et al., 2010; Sgnaulin et al., 2018). It is referred to as an environmental friendly aquaculture system (Emerenciano et al., 2013). It is a sustainable alternative due to its potential to efficiently recycle and reuse nutrients within the culture system (Dauda et al., 2017b; Kumar et al., 2017). Biofloc technology makes it possible to minimize water exchange and water usage in aquaculture systems through maintaining adequate water quality within the culture unit, while producing low cost bioflocs rich in protein, which in turn can serve as a feed for aquatic organisms (Crab, 2010; Crab *et al.,* 2007, 2009, 2010a). Compared to conventional water treatment technologies used in aquaculture, it provides a more economical alternative which decrease water treatment expenses upto 30% and additionally, a potential gain on feed expenses by utilizing the efficiency of protein twice as high in biofloc technology systems as compared to conventional ponds, making it a low-cost sustainable constituent to future aquaculture development (Avnimelech, 2009; De Schryver *et al.,* 2008).In biofloc technology, if carbon and nitrogen are well balanced in water, ammonium in addition to organic nitrogenous waste will be converted into bacterial biomass (Schneider et al., 2005). By adding carbohydrates to the water, heterotrophic bacterial growth is stimulated and nitrogen uptake through the production of microbial proteins takes place (Avnimelech, 1999). It is a technique of enhancing water quality through the addition of extra carbon to the aquaculture system through an external carbon source or elevated carbon content of the feed. This promoted nitrogen uptake by bacterial growth decreases the ammonium concentration more rapidly than nitrification (Hargreaves, 2006). Heterotrophic bacteria occur much more rapidly because the growth rate and microbial biomass yield per unit substrate of heterotrophs are a factor 10 higher than nitrifying bacteria (Hargreaves, 2006). The microbial biomass yield per unit substrate of heterotrophic bacteria is about 0.5 g biomass C/g substrate C used (Eding et al., 2006).

Biofloc fish farming is gaining popularity in Nepal as an effective and long-lasting technique for growing fish. This innovative technique involves creating an environment where microorganisms, such as bacteria and algae will form a biofloc to enhance water quality and provide a nutrient-rich environment for fish. Primarily, the strength of the biofloc technology lies in its 'cradle to cradle' concept as described by McDonough and Braungart (2002) in which the term waste does not exist. In biofloc technology, waste nitrogen generated by uneaten feed and excreta from the cultured organisms is converted into proteinaceous feed available for the same organisms. Instead of 'downcycling', a phenomenon often found in an attempt to recycle, the technique actually 'upcycles' through closing the nutrient loop. Hence, the water exchange can be decreased without deterioration of water quality and consequently the total amount of nutrients discharged into adjacent water bodies may be decreased (Lezama-Cervantes and Paniagua-Michel, 2010). Therefore, biofloc technology can also be used in the specific case of maintaining appropriate water temperature, good water quality and high fish survival in low/no water exchange, greenhouse ponds to overcome periods of lower temperature during winter. Fish survivability in overwintering tilapia cultured in greenhouse ponds with biofloc technology were excellent, being 97± 6% for 100 g fish and 80± 4 for 50 g fish (Crab et al., 2009). Moreover, at harvest, the condition of the fish was good in all ponds, with a fish condition factor of 2.1–2.3. Besides winter periods, we should be aware of the fact that future impacts of climate change on fisheries and aquaculture are still poorly understood and colder periods might be more often an issue to deal with in the future. To minimize possible negative impacts of climate change on aquaculture and maximizing opportunities will be through understanding and promoting a wide range of inventive adaptive new technologies, such as the biofloc technology combined with greenhouse ponds.

MATERIALS AND METHODS

Location of the experiment:

The experiment was conducted at the Aquaculture Research Center of Institute of Agriculture and Animal Science (IAAS), Paklihawa campus, Bhairahawa from 6th July, 2022 to 31st Sept. 2022 (90 days). The experimental site is located in 4 km southwest of Bhairahawa which is southern plain area of Nepal. The altitude of this site is about 256 masl (27.50 N, 83.450 E).

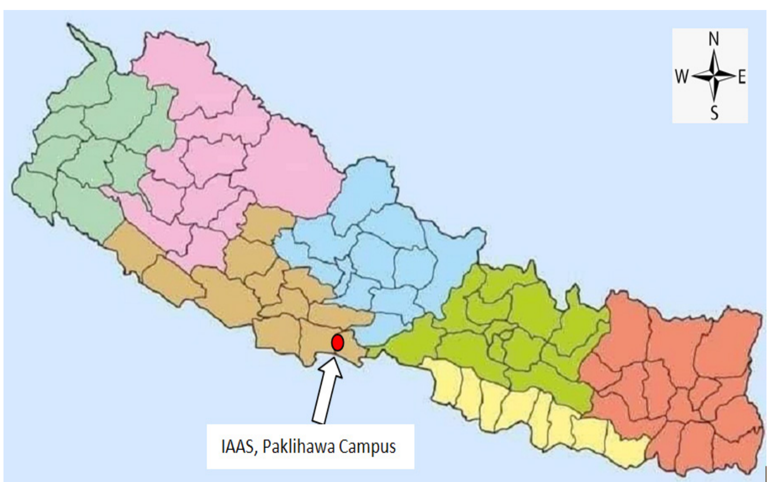

Figure 1: Map of Nepal showing IAAS, Paklihawa Campus

Experiment Details:

The experiment was conducted in 15 circular polytank with 500 liter water capacity. For the experiment, a Completely Randomized Design was used having the five treatments and three replications. The treatments were: (T1)-only clear water with no floc (Control), (T2)-with floc (Sugar as carbon source), (T3)-with floc (Corn flour as carbon source), (T4)-with floc (Rice bran as carbon source) and (T5)-with floc (Molasses as carbon source). Tilapia frys of average weight 4.05±0.44g were stocked in @ 50 fish/ 0.5m^3 each tank. All the carbon sources were maintained at C:N @ 10:1. First of all, tank was cleaned up, disinfected by Potassium Permanganate at 10 mg/L and the next day water was filled up with artisanal water with twenty four hour aeration system with aeroxy tube which was supplied by the two ring blower; one with 1 Hp and another was half Hp where one blower with one Hp was connected with direct electricity and another with half Hp was installed with battery for the sake of load shedding.

Water Preparation:

Initially, water preparation was done by adding 10g Probiotics (Provet AQUABAC), 50 g Molasses, 2.5 g Calcium carbonate and 500 g raw salt in each tank except control tanks with vigorous aeration in 28th June, 2022. Raw salt was cleaned up 2-3 times to remove the impurities and other contamination. After the 3 hours later Total Dissolved Solids (TDS) was measured by TDS meter (Techtonics Company). From the next day, floc was observed by manually prepared imhoff cone. For the carbon source, four type of ingredients namely Sugar, Rice bran, Corn flour and Molasses were added at 50 g per tank respectively on the basis of C:N ratio of 10:1 according to the treatments. This process was continued throughout the culture period. When the floc was found from 15 to 30 ml, then additional application carbon sources was stopped. And it was started based on the density of floc and the level of Ammonia in the respective tanks. Water Temperature, Dissolved Oxygen, pH and Total Dissolved Solids (TDS) was observed on daily basis whereas Ammonia was observed weekly basis. Along with it, floc were observed on routine basis. After the preparation of water, healthy Mono-Sex Tilapia seeds were purchased from Mandal hatchery, Patthardanda, Rupandehi and Shanti Matshya hatchery, Bhagalapur, Rupandehi which was produced at Center for Aquaculture- Agriculture Research and Production (CAARP), Chitwan, Nepal. Healthy Mono-Sex Tilapia seeds was stocked 50 number in each tank according Avnimelech (1999) at 50 fish/ 0.5m^3.

Cleaning and Water Exchange:

The sludge was cleaned up at every week interval by draining the sludge from the output. Based on the abundancy of sludge, new water was re-filled in the tank. And water aeration system was regularly check the flow rate and adjusted the entry cap accordingly. Furthermore, Aeroxi tube was also cleaned as to wipe out the excess clogging of floc and other debris. And in case of control with no floc, weekly partial draining the water was also done.

Feed Preparation:

Supplementary Pellet Feed was prepared in IAAS, Aquaculture Lab using manually operated feed machine. The supplementary feed was prepared based on the proximate analysis of the all ingredients used at Central Fisheries Promotion and Conservation Center, Balaju, Kathmandu. All the Five diets with the same levels of 25% of dietary protein for tilapia fish was formulated (Hamilton et al., 2019). The basal diet preparation includes rice bran, wheat flour, mustard oil cake, soybean meal, vegetable oil and vitamin-minerals premix was used. Feed formulation was done using the hit and trial method in the programmed MS-Excel sheet. The ingredients grinded by mixer, but mustard oil cake weighed on dry basis first and pre-soaked overnight before mixing. Vegetable oil and Additives as vitamin-mineral premix was mixed by sprayer homogenously. The prepared pellet diet was sun dried over one week and then stored in a plastic container.

Table 1. Ingredient (%) and proximate composition of different diets (% on dry matter basis)

SN	Proximate composition (Estimated Crude protein %)	Ingredients	Percentage
1	11	Rice bran	40
2	12	Wheat Flour	3
2	38	Mustard Oil cake	20
3	49	Soybean Meal	35
4	-	Vegetable oil	1
5	-	Vitamin and Mineral Premix *(Agrim Fort)	1
		Total	**100**

*Vitamin mineral premix /Kg contains the following : VitaminA 7,00,000 I.U, Vitamin D3 70,000 I.U, Vitamin E 250mg, Cobalt 250mg, copper 1200mg, Iodine 325mg, Iron 1500mg, Magnesium 6000mg, Potassium 100mg, Sodium 5.9mg, Manganese 1500mg, Sulphur 0.72%, Zinc 9600mg, DL-Methionine 1000mg, Calcium 25.5%, Phosphorus 12.75%

Feeding:

Pellet feeds were provided @ 3% of their body weight for the initial month and were adjusted to the next ration for the following months. The feed was delivered on morning time at 9 AM-10 AM.

Fish growth:

For growth measurement, about 20% of fish was sampled randomly on monthly basis. The growth of fish was measured in weight gain by deducting the average initial weight from the corresponding weight recorded in each month. The measurement of weight (g) of individual fish was done separately by using a portable electronic balance (PHOENIX Model: WT150001XJ Precision: 0.1 g). At the end of the experiment, all fishes were harvested and counted to assess the survival and production.

Data collection:

Data was collected on the basis of following growth parameters.

Growth Parameters

$$\text{Feed Conversion Ratio (FCR)} = \frac{\text{Quantity of feed supplied (kg)}}{\text{Net fish yield (kg)}}$$

$$\text{Daily weight gain (g/fish/day)} = \frac{\text{Final mean weight–Initial mean weight}}{\text{Culture period}}$$

Total weight gain (g) = Total harvest weight (g)-Total initial weight (g)

Total harvest weight (g) = Final harvest weight (g) - Initial stock weight (g)

$$\text{Gross Fish Yield (GFY) (kg/m}^3\text{/y)} = \frac{\text{Total harvest weight (kg)}}{\text{Culture period (days) x culture unit (m3) x 100}} \times 365$$

$$\text{Net fish yield (NFY) (kg/m}^3\text{/y)} = \frac{\text{Total harvest wt. (g) – total stocked wt. (g)}}{\text{Culture period (days) x Culture area (m3) x100}} \times 365$$

$$\text{Extrapolated Net Fish Yield (kg/m3)} = \frac{\text{Total harvest weight (g)- Total stocked weight (g)}}{\text{Culture period (days)* Culture unit (m2)*100}} \times 365$$

$$\text{Survival Rate \%} = \frac{\text{Total number of fish harvested}}{\text{Total number of fish stocked}} \times 100$$

Water Quality Analysis:

Dissolved Oxygen (DO), pH, and temperature were measured every day (8AM-10AM). Portable pH meter (Hana instrument, accuracy ± 0.1) was used to monitor pH. Likewise, dissolved oxygen meter (Lutron WA-2015 Multiparameter) was used to measure dissolved oxygen and temperature. Temperature in degree centigrade (ºC), dissolve oxygen in parts per million (mg/L) was noted for each value monitored. Also other water quality parameter such as Ammonia (mg/L) was measured using API Test Kit.

Proximate Analysis:

Quadrant sampling was done for experimental pellet feed during experiment period to draw representative diet sample for proximate analysis. Diet proximate analysis of sample was done according to AOAC (1990) at Central Fisheries Promotion and Conservation Center, Balaju, Kathmandu. Show the table for proximate analysis of each diet in results.

Harvesting:

Final harvesting of fishes was done after 90 days by draining each tank completely on termination of research. Harvested fish weight was measured using electronic balance. Fish were counted and their batch weight (g) was recorded.

Statistical Analysis:

The data were collected during the course of time and on the basis of individual fish observations, the population means for each growth parameter was computed. The analysis of variance was used to compare different growth parameters using SPSS version 3.6.3. The mean and standard errors was calculated for each treatment. The data entry was done through MS Excel 2016. The accepted level of significance was at 5%.

RESULTS

Growth Parameters:

The Initial mean weight, Total Initial Weight, Initial stock number, food conversion ratio (FCR) of five different treatments is presented in Table 2. There was significantly different among the treatments in Feed Conversion Ratio. The best performance with low FCR was found in T4 (0.96±0.04) and the poorest performance with high FCR was found in T1 (1.28±0.10). Likewise, daily weight gain (DWG) and survival (%) are given in Table 2. The initial mean weight of Tilapia fry in different treatment was 4.50±0.72 g, 3.71±0.33 g, 4.42±0.32 g, 3.60±0.42 g, 4.02±0.42 g in T1, T2, T3, T4 and T5 respectively which were not significantly different with each other ($p>0.05$). But, final mean weight of tilapia was significantly difference among the treatments ($p>0.05$). The highest final mean weight was found in T5 (40.44±0.97 g) and the lowest final mean weight was found in T1 (20.55±0.60 g).

Along with it, there was significantly difference in final stock number among the treatments. Result showed final harvest number was found highest in T5 (48.33±0.33) and the lowest in T1 (45.67±0.33). And there was no significantly difference in survivability of fishes among different treatments. In Daily Weight Gain, there was significantly different among other treatments ($p>0.05$) where highest DWG was found in T5 (0.40±0.01 g/fish/day) and the lowest was found in T1 (0.18±0.01 g/fish/day). Moreover, Gross Fish Yield in T5 (3.9±0.07 kg/tank) was significantly higher than T2, T3, T4 and T5 with the value of 3.2±0.01, 2.8±0.06, 2.7±0.02 and 1.9±0.03 kg/tank respectively. Furthermore, T5 (3.51±0.09

kg/m3) was also significantly higher in Extrapolated Net Fish Yield than T2, T3, T4 and T1 with the value of 2.82±0.04, 2.36±0.08, 2.33±0.06 and 1.43±0.06 kg/m3 respectively.

Table 2.Mean value of growth parameters of Biofloc during the experimental period of 90 days (Mean±SE)

Growth parameters	Treatments				
	T1(Control)	T2	T3	T4	T5
Stocking					
Initial Stock Number (No/tank)	50±0	50±0	50±0	50±0	50±0
Initial Mean Weight (g)	4.50±0.72	3.71±0.33	4.42±0.32	3.60±0.42	4.02±0.42
Total Initial Weight (Kg/tank)	0.22±0.04	0.19 ±0.02	0.22 ±0.02	0.18 ±0.02	0.20 ±0.02
Harvesting					
Final Mean Weight (g)	20.55 ± 0.60^{e}	33.22 ± 0.48^{b}	29.23 ± 0.32^{c}	28.64 ± 0.84^{d}	40.44 ± 0.97^{a}
Daily Weight Gain (g/fish/day)	0.18 ± 0.01^{e}	0.33 ± 0.01^{b}	0.28 ± 0.01^{c}	0.28 ± 0.01^{d}	0.40 ± 0.01^{a}
Gross Fish Yield (Kg/tank)	1.9 ± 0.03^{d}	3.2 ± 0.01^{b}	2.8 ± 0.06^{c}	2.7 ± 0.02^{c}	3.9 ± 0.07^{a}
Net Fish Yield (kg/m3)	1.43 ± 0.06^{d}	2.82 ± 0.04^{b}	2.36 ± 0.08^{c}	2.33 ± 0.06^{c}	3.51 ± 0.09^{a}
Extrapolated Net Fish Yield (kg/m3)	5.7 ± 0.23^{d}	11.27 ± 0.16^{b}	9.46 ± 0.33^{c}	9.31 ± 0.24^{c}	14.02 ± 0.38^{a}
FCR	1.28 ± 0.10^{e}	0.91 ± 0.02^{b}	1.01 ± 0.03^{d}	0.96 ± 0.04^{a}	0.87 ± 0.02^{c}
Survival (%)	91.3±0.7	96.0±0.0	96.0±1.2	94.0±0.0	96.7±0.7

(T1= Only Water (Control); T2= Sugar; T3= Corn Flour; T4= Rice bran and T5= Molasses. Mean value with different superscript letter within same row are significantly different at $p < 0.05$)

Table 3. Mean and Range of Water quality parameters of different treatments during the experimental period of 90 days (Mean±SE)

Growth parameters	Treatments				
	T1(Control)	T2	T3	T4	T5
Temp (^{0}C)	32.3±0.2 (29.9-34.6)	32.3±0.3 (29.9-34.9)	32.2±0.0 (30.2-35.0)	32.5±0.2 (29.9-34.9)	32.4±0.0 (29.7-34.9)
DO (mg/L)	6.2±0.1 (4.5-7.9)	6.2±1.3 (4.4-7.9)	6.2±0.5 (4.5-7.9)	6.8±0.7 (4.5-7.9)	6.1±0.7 (4.6-7.3)
pH	7.1±0.3 (5.7-8.8)	7.2±0.1 (5.7-8.8)	7.1±0.2 (5.5-8.6)	7.5±0.5 (6.3-8.7)	7.0±0.1 (5.6-8.9)
NH_3 (mg/L)	0.49±0.12 (0.00-1.00)	0.54±0.41 (0.00-1.00)	0.54±0.32 (0.00-1.00)	0.34±0.04 (0.00-1.50)	0.49±0.05 (0.00-1.00)
TDS (mg/L)	687.64 ± 18.3^{c} (426-842)	1361.71 ± 24.1^{b} (1011-1543)	1357.08 ± 23^{b} (1060-1564)	1345.94 ± 23.1^{b} (1060-1567)	1439.39 ± 26.4^{a} (1060-1571)

(T1= Only Water (Control); T2= Sugar; T3= Corn Flour; T4= Rice bran and T5= Molasses. Mean value with different superscript letter within same row are significantly different at $p < 0.05$)

Mean and range of Water quality parameters of different treatments during the experimental period of 90 days is shown in Table 4.There was no significantly different among the treatments in Temperature, Dissolved oxygen, pH and Ammonia. But, Total Dissolved Solids in T5 (1439.39 ±26.4 mg/L) was significantly higher than T2, T3, T4 and T1 with the value 1361.71±24.1, 1357.08±23, 1345.94±23.1 and 687.64±18.3 mg/L respectively. Weekly mean and range of water quality parameters such as temperature, dissolved oxygen, pH and ammonia were not significantly different among the treatments at $p < 0.05$. The highest temperature was found in T4 (33.3 °C) in 14 Sept. 2022 whereas the lowest was found in T4 (29.3 °C) in 31st July, 2022 (Figure 2). Similarly, the highest Dissolved oxygen was found in T4 (7.3 mg/L) in 21st Aug., 14th Sept., 21th Sept. and 31st Sept. 2022 and the lowest was found in T4 (5.7mg/L) in 31st July, 2022 (Figure 3). The highest pH was found in T2 (10.6) in 7th Aug. 2022 and the lowest pH was found in T3 and T5 with the value of 6.5 in 31st Aug. 2022 respectively (Figure 4). In case of Ammonia, the highest and the lowest value was found in T4 (1.04 mg/L) in 21st Aug, 2022 and T4 (0.19 mg/L) in 31 Sept., 2022 (Figure 5). Moreover, Total dissolved solids was found highest in T5 (1567.3 mg/l) in 31st Sept. 2022 and lowest in T1 (507.1 mg/L) in 13th July, 2022 (Figure 6).

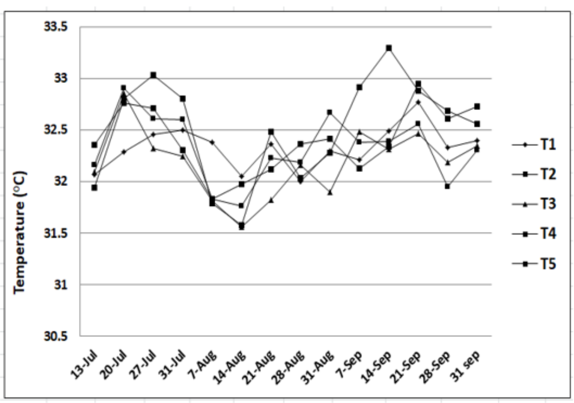

Fig.2. Monthly Mean Temperature (°C) among the treatments during the experimental period

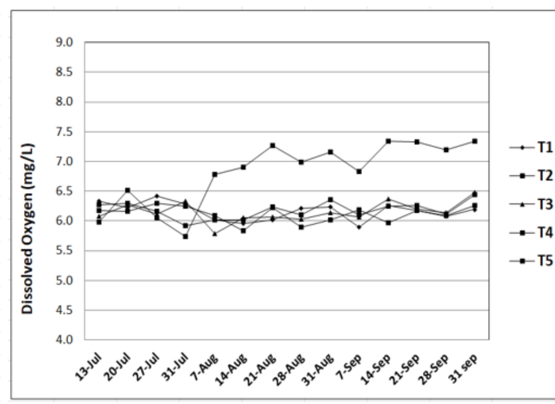

Fig.3. Monthly Mean Dissolved Oxygen (mg/L) among the treatments during the experimental period

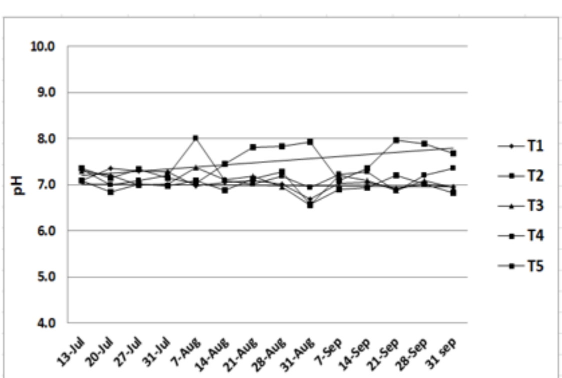

Fig. 4. Monthly Mean pH among the treatments during the experimental period

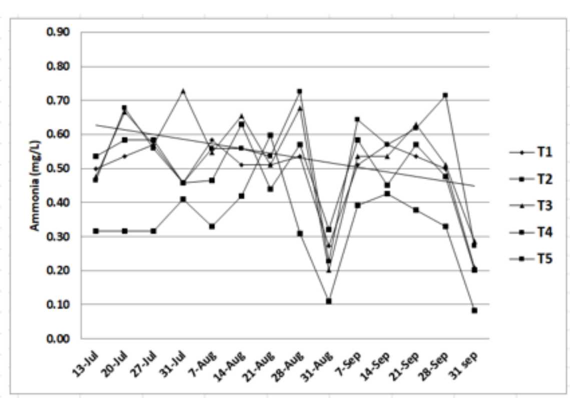

Fig. 5. Monthly Mean Ammonia (mg/L) among the treatments during the experimental period

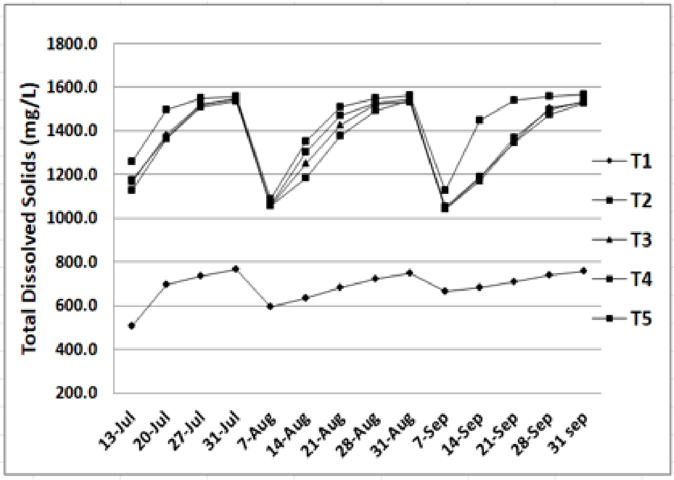

Fig.6. Mean Total Dissolved Solids (mg/L) among the treatments

DISCUSSION

The preliminary growth performance of tilapia in biofloc system was assessed. The present study demonstrated that the growth rate of tilapia varied in different carbon sources used in C/N ratio 10:1 among the different treatment within 90 days period. The final mean weight and daily growth rate of tilapia in the present experiment were 20.55, 33.22, 29.23, 28.64 and 40.44 g and 0.18, 0.33, 0.28, 0.28 and 0.40g/fish/day respectively in T1(without floc), T2(floc with sugar), T3 (floc with rice bran), T4 (floc with corn flour) and T5 (floc with molasses). These results match with the findings of Silva et.al. (2017) who achieved the best growth of Molasses as a source in C/N ratio of 10:1 for rearing Nile tilapia with biofloc technology. The growth rate of tilapia in the present experiment was higher than those reported by Nugroho et.al. (2020). The better growth rate of tilapia in the present experiment might be attributed to the proper carbon source with optimum amount of floc production and reducing the level of ammonia. The survival was found to be highest in T5 (with molasses) 96.7 %which was also supports with the findings of by Nugroho et.al. (2020).

The gross fish yield and extrapolated net fish yield of tilapia in the present experiment were 1.9, 3.2, 2.8, 2.7 and 3.9 kg/tank and 1.43, 2.82, 2.36, 2.33 and 3.51 kg/m3 respectively in T1 (without floc), T2 (floc with sugar), T3 (floc with rice bran), T4 (floc with corn flor) and T5 (floc with molasses). Although growth of fish seems not found satisfactory. It might be due to floc could not form very well. As each rearing tank was covered with opaque lid and furthermore the whole biofloc unit was covered with straw roof, by which light penetration could not happen well which is stated by Ogello et.al., (2021) and Carbon and Nitrogen ratio is not appropriate for the floc preparation, it should be maintained above C/N ratio with 10:1 as stated by Avnimelech, (1999); Ebeling et.al., (2006).

The water quality parameters of experimental pond tank recorded throughout the study period and were within the acceptable ranges for tilapia culture in biofloc system as reported by Day et.al. (2016).The finding shows that best growth rate with an daily weight gain of 0.40±0.01 g/fish/day and the best feed conversion ratio (FCR) of 0.96±0.04 was almost resembles with tilapia culture in biofloc system whereas lowest average daily gain (0.32±0.01 g/day) and highest feed conversion ratio (0.97±0.0) respectively was found in T1 (with no floc). Similarly, Mean Dissolved Oxygen (6.1±0.7mg/L) and pH (7.0±0.1) in T5 (with molasses added) was similar result with the findings of Nahar et.al. (2015) where mono-sex tilapia grown in biofloc system fed with commercial feed was found Mean Dissolved Oxygen (5.2±0.2mg/L) and pH (7.1±0.1) respectively.

CONCLUSION

From this research, molasses is found as a good candidate among the other carbon sources at C/N ratio 10:1 for microbial floc formation. Further work is needed to detect the optimal C/N ratio for the grow out phase under biofloc system.

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