
Rearing of some plankton species in laboratory conditions for fish larvae as lived feedAdane Melaku^{1*}, Abraham Amare¹, Tizazu Yitayew¹¹Bahir Dar Fishery and Other Aquatic Life Research Center, P.O. Box 794, Bahir Dar, Ethiopia*Corresponding author email: adane.melaku@yahoo.com

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ABSTRACT**Received:** February 20, 2021**Revised:** May 24, 2021**Accepted:** June 28, 2021**Available online:** June 30, 2021

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Rearing of some plankton species in laboratory conditions for utilization as live feed for fish larvae was conducted in 2019 at a laboratory. Batch experiments were carried out in three consecutive phases. Phase I was the culture of Scenedesmus species by using Guillard's F/2 media and NPSZn fertilizer treatments. Phase II was the culture of Daphnia magna with the feed of the cultured Scenedesmus sp. and algae harvested from fishponds. Phase III was the development and survival of catfish larvae after feeding with cultured D. magna and artificial feed of boiled chicken yolk and soybean. The specific growth rate of the cultured Scenedesmus sp. was 0.28 and 0.31 per day in the experiments of NPSZn fertilizer and Guillard's F/2 media, respectively. The total biomass of the cultured algae was 144 µg/L. The abundance of cultured Daphnia sp. showed an increasing tendency with the number of days cultured. The survival rate of the African catfish larvae was 30.37%. However, the larva showed fast growth and good weight gain in a short time when fed with live Daphnia sp. compared to the artificial soybean feed. Thus, during the feeding time of Live D. magna in the laboratory, African catfish larvae grew quickly and gained a lot of weight.

1. INTRODUCTION

An option for keeping cultured stock healthy is to feed them live food in addition to additional artificial feed because of this, Essential proteins, lipids, carbohydrates, vitamins, minerals, amino acids and fatty acids are all found in live food species (New 1998). As a result, the nutritional components of natural live foods must be important to feed the fish larvae in order to achieve optimum fry production and profitability in aquaculture. Phytoplankton and zooplankton creatures that can swim in the water column and are always available to fish larvae play a significant role in aquaculture as a source of zooplankton for feeding fish and other larvae (Murugesan et al 2010). They supply vital nutrients such as vitamins, essential poly-unsaturated fatty acids (PUFA), pigments, and sterols, in addition to protein (necessary amino acids) and energy, which are passed along the food chain and the nutritional value of any algal species is determined by cell size, digestibility, toxic compound production, and biochemical composition (Murugesan et al 2010). Fishes have a diverse range of live food preferences and may be classified as herbivores, carnivores, omnivores and detritivores (Evjemo et al 2003). Zooplankton generally feed on phytoplankton and constitutes a major part of the diet for freshwater fish larvae in the natural food web (Evjemo et al 2003). They are crucial in fish hatchery because they are the first food for many cultured fishes. The larvae of most fish species prefer to feed on live zooplankton due to their easy digestibility (Das et al 2012). They have also a high food value as protein source of fish than artificial supplemented feed, and contain enzymes like amylase, protease, exonuclease and esterase, which play important role in larvae nutrition (Yamamoto et al 1994).

Among the live feed zooplankters, cladocerans are important components in

most freshwater fish communities (MacIsaac and Gilbert 1991). Three cladocerans, namely: *Moina*, *Daphnia* and *Ceriodaphnia* sp. are important as live food fishes. *Moina* is smaller in size (0.5 to 2 mm) than *Daphnia*, containing 70% more protein and it is suitable for the replacement of *Artemia* in aqua hatcheries (Pronob et al 2012). The species of *Moina* has also been extensively used as live food in many hatcheries and in the maintenance and culture of commercially important fish in aquarium (Pronob et al 2012). *Daphnia* is big in size and serve as live food for advanced stages of fishes. It contains a broad spectrum of digestive enzymes such as proteases, peptidases, amylase, lipase and even cellulase which serve as exoenzymes in the gut of fish (Murugesan et al 2010). In our hatchery experiments of fish larvae, we have been using the commercially purchased *Artemia* cyst. This species of shrimp is saline species and not easily available on the market. It is also very costly and increases the production cost of hatchery (Watson and Yanong 2012). Due to these reasons, *Artemia* cysts were not taken as experimental diets in this experiment. Therefore, it is a need to search for easily available live feed in developing countries such as Ethiopia, which aspires to promote aquaculture development.

In this experiment, phytoplankton consist of chlorophyll-bearing organisms like *Scenedesmus* sp. and zooplankton consist of plankters like *Daphnia magna* (cladoceran) that were cultured in the laboratory conditions. The selection criteria for these plankton species are due to their wide distribution in fresh water and ease of culture (Castillo 1981). Thus, the objective of this study is to develop a cultivation system by determining the optimal plankton production level for use as live fish feed in a laboratory condition. The limitation of the present study is that

the rearing of some species of plankton in laboratory conditions for use as live feed for fish larvae was not carried out under controlled and continuous light and temperature conditions due to intermittent electrical power failures which may have led to dissolved oxygen deficiency in the system.

2. MATERIALS AND METHODS

Phase I: Culture of *Scenedesmus* species

The experiment was conducted in two treatments in 2019 at Bahir Dar Fishery and Other Aquatic Life Research Center. Treatment 1: *Scenedesmus* spp. were cultured using Guillard's F/2 media whereas treatment 2: they were cultured using 0.1 g/L NPSZn fertilizer. The *Scenedesmus* sp. were selected by continuous trials based on algal culturing

techniques (Anderson 2005). The lake water was sterilized with the 'double boil' technique by boil at 120 °C and cool at room temperature (Guillard 1975). For treatment, 1 medium was prepared by adding 2 main chemicals (nitrate and phosphate) and 6 trace elements (iron (Fe), sodium (Na), copper (Cu), zinc (Zn), cobalt (Co) and manganese (Mn)) to distilled water (Table 1). The F / 2 stock was stored in the refrigerator and added to the sterilized lake water. The chemical preparation (Treatment 1) was listed below in Table 1 (Guillard 1975 and Anderson 2005). However, for treatment 2, 0.1 g/L of NPSZn fertilizer medium was used (Guillard 1975; Goswami 2011). The *Scenedesmus* sp. was inoculated at 10% of the receiving volume (Guillard 1975).

Table 1: Constituents of Guillard's F/2 media for culturing *Scenedesmus* species

Major nutrient	Chemical formula	Concentration (gram/liter)
Nitrate	NaNO ₃	75.0 g
Phosphate	NaH ₂ PO ₄ .H ₂ O	5.0 g
Trace metals		
	FeCl ₃ .6H ₂ O	3.5 g
	Na ₂ EDTA	4.36 g
Dissolved in 900 ml of distilled H ₂ O		
Then, add 1 ml of each of the following trace metal solutions		
	CuSO ₄ .5H ₂ O	0.98 g/100 ml
	ZnSO ₄ .7H ₂ O	2.20 g/100 ml
	CoCl ₂ .6H ₂ O	1.00 g/100 ml
	MnCl ₂ .4H ₂ O	18.00 g/100 ml
	Na ₂ MoO ₄ .2H ₂ O	0.63 g/100 ml

The algae culture was maintained in 1 liter of plastic bottles at 25 °C by providing electric light. The culture was air-supplied from the atmosphere using an air pump (230 V, 20 W and capacity 1500LPH) through a vinyl tube (4 mm) through the drilled hole of the cap, and the other hole with a glass tube allowed the gas to pass into the culture bottle when excess and to make a positive pressure inside the bottle. The light was supplied by two horizontals 'cool white' 36 W florescent lamps. The

algae were culture for one week (7 days) after this weekly 2/3 of the culture water was removed and replaced by sterilized and filtered lake water to maintain the culture at optimum growth of algae at exponential phase (Guillard 1975; Anderson 2005). The cell density of algae collected from different cultured bottles was estimated twice a week using an improved Neubauer haemocytometer (model No. BS748, depth 0.1mm, 1/400mm²) as described by Rahman

(1992). The total biomass of algae (chlorophyll-*a*) was measured by using handheld TURNER fluorometer (TURNER).

Phase II: Culture of *Daphnia magna*

The *D. magna* was collected from Lake Hayke in 2017 because this specie isn't found in Lake Tana, and it was introduced to the laboratory stock culture after two days. The production of *D. magna* was carried out with two experiments. For treatment 1: Cultured *D. magna* was fed the cultured *Scenedesmus* species of, while for treatment 2: *D. magna* was fed with microalgae from ponds filtered by a 40 µm size plankton net. The 300 ml plastic vessels were filled with lake water filtered by 40 µm plankton net. *Daphnia magna* was inoculated with the same number (4 individuals) of organisms in four plastic vessels. Atmospheric oxygen was supplied via a vinyl tube using an air pump. Treatment 1 was fed 50 ml freshly cultured algae (that is, *Scenedesmus* species). Treatment 2 was fed microalgae filtrate (50 ml) obtained using 40 µm plankton net from ponds in a 300 ml volume of plastic vessel. The cultures were refreshed twice a week (Guillard 1975; Rottmann *et al* 2011). Continuous aeration was provided by aerators connected by a narrow vinyl tube. The experiment was subjected to 12-hour light and 12-hour dark conditions.

The YSI 556 multi-probe system was used to measure dissolved oxygen (DO), conductivity, pH, temperature, salinity, and total dissolved solids (TDS) for culturing units. Ammonia-nitrogen (NH₃) was measured using filtered composite samples by the indophenol method. Nitrate and nitrite-nitrogen (NO₃ and NO₂) were analyzed by the Palintest nitrate test and Palintest Nitricol methods, respectively. Phosphate (PO₄) was analyzed by the Palintest Phosphate LR method, while total hardness and alkalinity was done by colorimetric method with a Palintest transmittance display photometer 5000

(Wagtech International). The abundance of *D. magna* was counted and estimated in a white Petri dish using eromex microscope (Holland, magnification 0.7-4.5*10) twice a week from each plastic vessel. When *D. magna* reached to the high density, it was used as live feed for catfish larvae, by filtering with 100 µm mesh size plankton net.

Phase III: Development and survival of catfish larvae

Three days old catfish (*C. gariepinus*) larvae were taken as an experimental animal from artificially hatched fingerlings in the laboratory. Hundred (100) catfish larvae were stocked in each 60 L glass aquaria and the water temperature was maintained at a temperature of 25 °C using aquarium heater. During all the treatments conducted, continuous aeration was supplied by using an air pump. One treatment and its replication were fed with 5000 live *D. magna* (Castillo 1981) for 14 days twice a day after 14 days whereby the catfish larvae started to take artificial feeds (Yasmin *et al* 1998). The other two treatments with their replication were fed boiled chicken yolk and soybean (absence of artemia cyst in Ethiopia) separately twice a day in the aquaria for 14 days after this day it starts to take artificial feed continued as usual by take any feed items (Awaiss and Kestemont, 1998; FAO, 2018). Initial length and weight of fish larvae was measured by measuring board and sensitive balance at the beginning of the treatment. The mortality of catfish larvae was recorded daily in the morning and the final length and weight of fish in each treatment was measured at the end of the experiment. The remnants (faeces and dust) in the aquariums were siphoned from the bottom using a vinyl tube, and also one third of the water was replenished from rearing aquariums with the least disturbance to the fish larvae. Parameters like temperature, pH, and dissolved oxygen (DO) of the medium were measured daily using multimeter YSI 556.

Determination of the specific growth rate of phytoplankton

Specific Growth Rate (μ) is a measure of the number of generations (the number of doublings) that occur per unit of time in an exponentially growing culture (Guillard and Ryther 1962). The exponential (straight line) phase of growth was

carefully determined, and specific growth rate was obtained using following equation (Guillard and Ryther 1962).

$$\mu = \frac{\ln(N_t/N_0)}{T_t - T_0}$$

Where, N_t = Number of cells at the end of log phase, N_0 = No of cells at the start of log phase, T_t = Final day of log phase, T_0 = Starting day of log phase

Survival and mortality rates of catfish larvae

After 14 days of feeding experiment, the fish larvae were counted to determine the survival and mortality percentage (Ricker 1975; Afolabi et al 2013):

$$\text{Survival rate (\%)} = \frac{\text{Number of fish at the end of the experiment}}{\text{Number of fish at the beginning of the experiment}} \times 100$$

$$\text{Mortality rate (\%)} = \frac{\text{Number of fish that died during the experiment}}{\text{Number of fish at the beginning of the experiment}} \times 100$$

Growth performance of fish larvae

Fish body weights were recorded at the beginning day and the end of the feeding experiment for all fish. The following formulas were used to estimate the growth parameters (Ricker 1975; Afolabi et al 2013):

$$\text{Mean Weight Gain (MWG; g)} = \text{Final mean weight (W1)} - \text{Initial mean weight (W0)}$$

$$\text{Specific Growth Rate (SGR; g/day)} = \frac{\ln(\text{Final mean weight}) - \ln(\text{Initial mean weight})}{\text{Length of feeding trial (days)}}$$

3. RESULTS AND DISCUSSION

Phase I: Culture of *Scenedesmus* species

At both treatment numbers 1 and 2, the cultivated *Scenedesmus* species had the same biomass of 144 g/L. According to (FAO 1996; Das *et al* 2012), the *Scenedesmus* species were used to important to feed zooplankton (*D. magna*) during rearing catfish larvae. The logarithmic phase of the growth rate was between the days of 16-24 for both experiments (Figure 1). The specific growth rates (μ) of treatment 1 and treatment 2 were 0.281 g/day and 0.31 g/day, respectively. The results indicated the specific growth rate at NPSZn (treatment 2) was slightly greater than chemical preparation (treatment 1). Therefore, treatment 2 was recommended for algal culture purpose for rearing zooplankton due to the accessibility of fertilizers. However, statistical analysis

using analysis of variance (ANOVA) showed an insignificant difference ($P > 0.05$) between the two treatments. The total biomass of the cultured algae was 144 $\mu\text{g/L}$ in treatment number 1 and 2, while the net biomass of the cultured algae was 129 $\mu\text{g/L}$. The graphs of both cultured algae showed a typical growth pattern of algae starting from the lag phase up to the stationary phase under laboratory conditions (Figure 1). The growth pattern is similar to the others' report (Guillard 1975; Carlsson *et al* 2007; Fatemeh and Mohsen 2016; FAO 1996). In the final stage of the stationary phase, the cell density of *Scenedesmus* species showed stable because this might be due to the reduction of nutrient, light intensity, dissolve oxygen, contamination, and disorder of pH (Carlsson *et al* 2007). According to Carlsson *et al* (2007) and Fatemeh and Mohsen (2016) the high biomass ($3/4^{\text{th}}$) of *Scenedesmus* sp.

production was used to be feed the *D.magna* and the reaming biomas1/4th was

used as a new culture before reaching a decline phase.

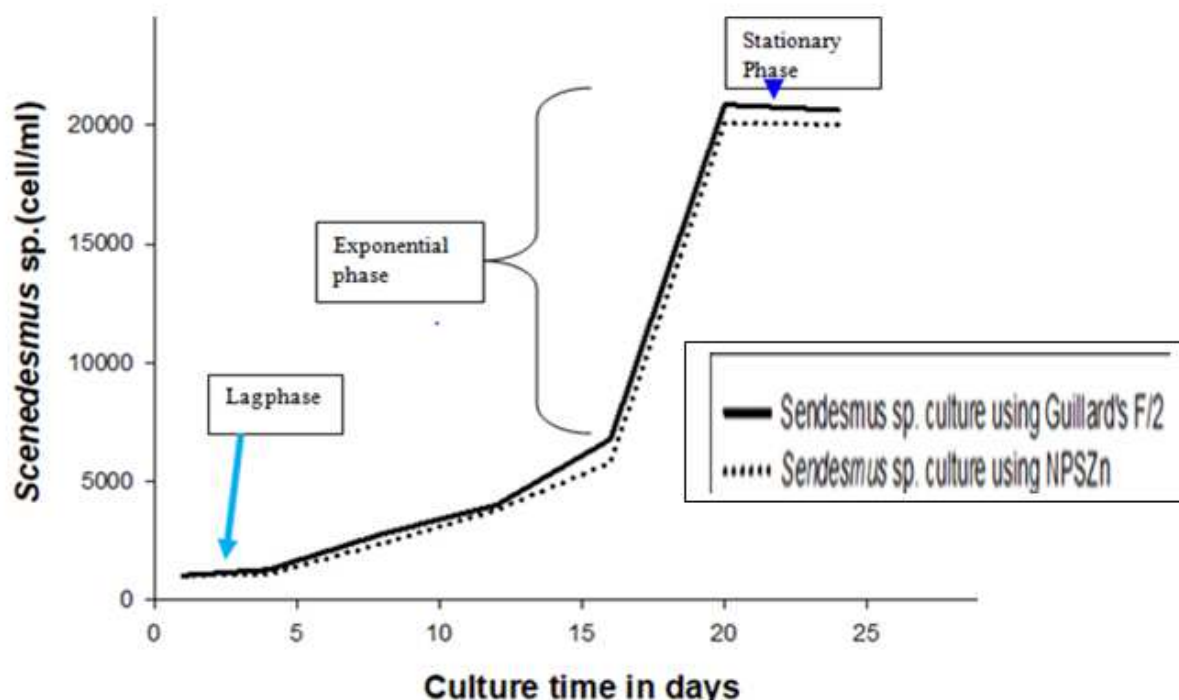


Figure 1. Growth rate of *Scenedesmus* sp. in laboratory between December and January 2019.

Phase II: Culture of *Daphnia magna*

The absolute mean temperature and pH of culture medium for *D. magna* was maintained above 25 °C and 7, respectively. At a temperature of 25 °C reproduction of *Daphnia* sp. was good which is similar to the suggestion made by Castillo (1981). The pH of culture medium for most of the investigators who worked on *D. magna* found that this animal does very well in pH of between 7.6 to 8.6 (Castillo 1981; Rottmann *et al* 2011). The evaporated oxygen was greater than 3.5 mg/L and the ammonia level was less than 0.2 mg/L (Table 2). These results are important for the successful culture of *Daphnia* species (FAO 1996).

Table 2: The average of physicochemical parameters in *Daphnia* species cultivated media.

Parameter	T (°C)	Sp. Cond (μs/cm ²)	TDS (mg/L)	Salinity (ppt)	DO (mg/L)	pH
Mean±SD	25.70±1.26	166.5±111.02	327.5±272.5	0.08±0.06	4.54±0.64	7.63±0.03

Parameter	NH ₃ (mg/L)	PO ₄ (mg/L)	NO ₃ (mg/L)	NO ₂ (mg/L)	Total hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
Mean±SD	0	2.56±1.67	4.4	0.84±1.14	82.5±3.53	60.5±6.36

NB: T (°C) = Temperature in degree Celsius, Sp. Cond (μs/cm²) = Specific conductivity in micro-Siemens per centimeter square, TDS (mg/L) = Total dissolved solids in milligram per liter, ppt = Parts per trillion, DO = Dissolved oxygen, NH₃ = Ammonia, PO₄ = Phosphate, NO₃ = Nitrate, NO₂ = Nitrite, CaCO₃ = Calcium carbonate

The female *Daphnia* species carried the highest number of eggs in its brood chamber, which was about 12 eggs per female. Culture media conditions are favorable; the *Daphnia* species can produce up to 40 eggs in its brood chamber. During the experiment, resting eggs were discovered, which drastically reduced their reproductive and survival rates. As a result, food may become scarce, resulting in poor water quality (Castillo 1981). The number of *D. magna* increased from day (5) to a maximum level (20 days) during count by using a microscope in the laboratory but, after 20 days it started to drop off (Figure 2). The maximum number of *Daphnia* sp. in both cultures was in the range of 200-870. Eight hundred seventy (870) and two hundred (200) *D. magna* were recorded at treatment 1 (50 ml *Scenedesmus* sp algae provided) and treatment 2(50 ml algae

from pond provided), respectively in 300 ml plastic vessels in laboratory. The number of *D. magna* in treatment 1 was greater than treatment 2 (Figure 3). Statistical analysis showed significant difference between the two experiments (One-way ANOVA; $P < 0.05$). The difference in the number of *D. magna* species between the two treatments may be due to the difference in algal species and water quality that determined *D. magna*'s growth and harvestable biomass of *D. magna* (FAO 1996; Kraul 1989). The algae identified by using compound microscope (Olympus, Japan, serial number 1L0068). The identified species of blue green algae were *Microcystis* sp. and *Anabaena* sp. This situation may reduce ingestion, assimilation, survival rate and reproduction of *Daphnia* sp. (Castillo 1981).

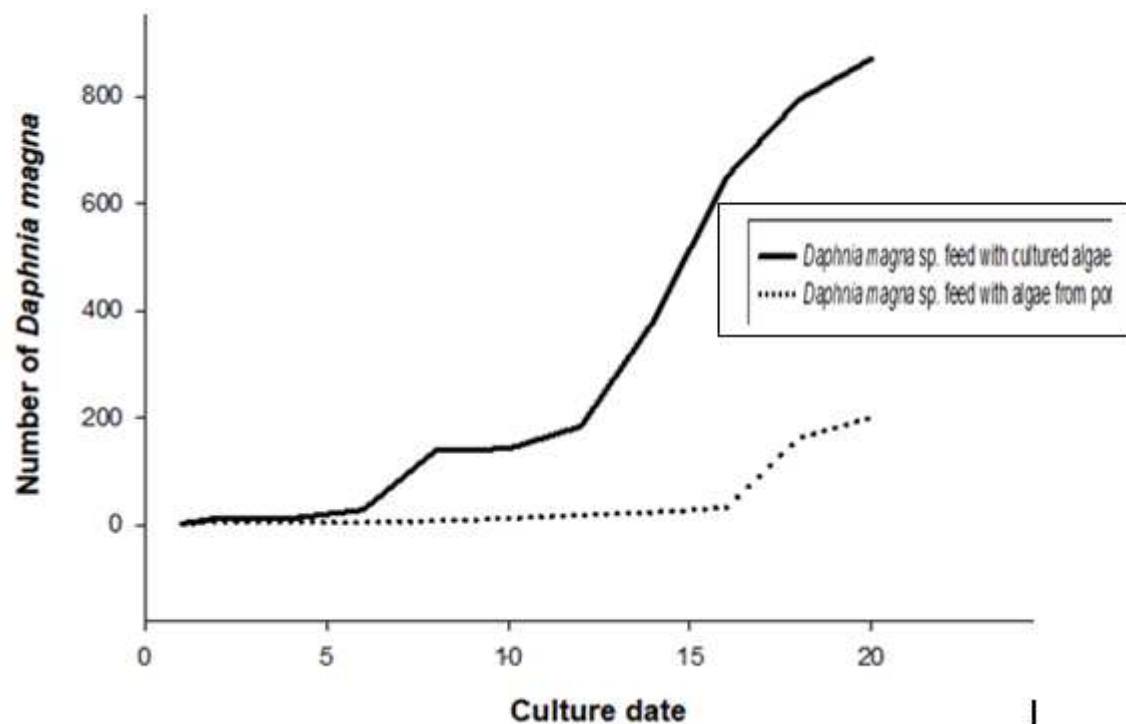


Figure 2. Show The trends of *Daphnia magna* cultured in 300 ml plastic vessel under laboratory conditions.

Phase III: Development and survival of African catfish larvae

The mean of set temperature of the water was 25.3 °C and the mean pH of the water was 7.2 (Table 3). According to USEPA (1991), the current temperature and pH value was important

for rearing African catfish larvae. The present electrical conductivity and salinity was important for the survival of fish (Wetzel 2001; Friedl *et al* 2004). According to Geneviève and James (2008), the present dissolved oxygen greater than 2 mg/L was enough to survive the catfish larvae in clean water.

Table 3: Mean (\pm SD) of physico-chemical properties of water used for catfish larval rearing in glass aquarium at different feeding regimes items

Types of feed	T ($^{\circ}$ C)	Sp. Cond (μ s/cm ²)	TDS (mg/L)	Salinity (ppt)	DO (mg/L)	pH
Live feed (<i>D. magna</i>)	25.3 \pm 0.66	165.43 \pm 4.08	104.29 \pm 2.69	0.07 \pm 0.01	5.39 \pm 0.14	7.22 \pm 0.11
Chicken egg yolk	25.3 \pm 0.66	169.43 \pm 6.76	104.86 \pm 2.91	0.07 \pm 0.01	4.94 \pm 0.32	7.26 \pm 0.10
Soybean	25.3 \pm 0.66	178.29 \pm 12.03	107.71 \pm 6.90	0.07 \pm 0.01	4.83 \pm 0.32	7.19 \pm 0.11

NB: T ($^{\circ}$ C) = Temperature in degree Celsius, Sp. Cond (μ s/cm²) = Specific conductivity in micro-Siemens per centimeter square, TDS (mg/L) = Total dissolved solids in milligram per liter, ppt = parts per trillion, DO = dissolved oxygen, *D. magna* = *Daphnia magna*.

The mean of major nutrients obtained for the treatments (feeding groups) were presented in table 4. The mean values of ammonia level in all fed groups were less than 0.1 mg/L, and there was no significance difference among all feeding groups ($P > 0.05$; Table 4). The range of nitrate and nitrite concentration was 1.2 to 1.5 mg/L and 0.01 to 0.02 mg/L for all feeding group respectively. According to Bhatnagar and Devi (2013), described the favorable range of nitrate concentration is 0.1 mg L⁻¹ to 4.0 mg L⁻¹ in fish culture water. Thus, the present results were permitted this requirement. Naturally occurring levels do not exceed 0.3 mg/l for nitrite (Bhatnagar et al 2004). Of course,

the current results of culture showed within these ranges. The current range of phosphate concentration was 0.05 to 0.06 mg/L in the feeding groups. According to Bhatnagar et al (2004) suggested 0.05-0.07 ppm is optimum for fish culture. Thus, based on this literature the concentration of phosphate was permissible the limit. The range of total hardness and alkalinity was 72 to 85 and 63 to 72 mg/L CaCO₃ in the feeding groups. According to Bhatnagar et al (2004) suggested that the total hardness and alkalinity acceptable range of above 20 mg L⁻¹ CaCO₃ and less than 400 mg L⁻¹ CaCO₃ for fish culture.

Table 4: shows the major nutrient levels in aquarium water at various feeding items

Types of feed	NH ₃ (mg/L)	PO ₄ (mg/L)	NO ₃ (mg/L)	NO ₂ (mg/L)	Total hardness (mg/L CaCO ₃)	Alkalinity (mg/L CaCO ₃)
Live feed (<i>D. magna</i>)	0.00	0.05 \pm 0.05	1.2 \pm 0.48	0.01 \pm 0.00	72.0 \pm 17.09	63.33 \pm 10.60
Chicken egg yolk	0.01 \pm 0.01	0.05 \pm 0.03	1.5 \pm 0.09	0.02 \pm 0.01	78.3 \pm 10.40	71.67 \pm 11.55
Soybean	0.01 \pm 0.01	0.06 \pm 0.02	1.5 \pm 0.07	0.015 \pm 0.02	85.0 \pm 5.00	71.00 \pm 17.06

NB: NH₃ = Ammonia, PO₄ = Phosphate, NO₃ = Nitrate, NO₂ = Nitrite, mg/L = Milligram per liter, *D. magna* = *Daphnia magna*, CaCO₃ = Calcium carbonate

The final mean weight and total mean length of African catfish larvae were 0.25 g and 2.65 cm, respectively at live feed of *D. magna* fed group, while the final mean weight and total mean length at the feed of chicken yolk and soybean fed group were 0.029 g and 0.68 cm, and 0.01 g and 0.1 cm, respectively (Table 5). The highest weight gain was obtained in the live feed of *D. magna*, while the lowest mean weight gain of larvae was found in the artificial feed of soybean. The highest specific growth rate (0.23 g/day) of African catfish larva was obtained at the live feed of *D. magna*, while the lowest specific growth rate (0.01 g/day) was obtained at the feed of soybean fed group. The specific growth rate and mean weight gain of catfish larvae showed significant difference among all feeding groups ($P < 0.05$).

The highest survive rate (30.37%) of the African catfish larvae was observed in the live feed of *D. magna* while the lowest

survive rate (1%) was obtained in the artificial feed of soybean (Table 5). The survival rate of the African catfish larvae showed significant difference among the feeding group of the fish larvae ($P < 0.05$). However, in this trial survival rate of African catfish larvae was less than 50%, i.e., low survival rate and high mortality rate. This might be due to the presence of cannibalism behavior of African catfish and pathogens in the lake water used without chemical treatments (Mukai et al 2013) and not the problem of live feed (*D. magna* is employed as a live feed for the fish, and no health issues have been reported naturally) which is very sensitive than the catfish larvae. Even though, high mortality of catfish was registered in this experiment, according to FAO (1996) and Kraul (1989) live planktonic food is very important to fulfill the required balanced diet for better survival and growth of fish larvae and solved the deficiency and inaccessibility of *Artemia* cysts.

Table 5: Show the mean body length, weight (mean \pm standard deviation), survival rate and specific growth rate of catfish larvae (*Clarias gariepinus*).

Types of feed	Initial weight (g)	Final weight (g)	Final length (cm)	Survival rate (%)	Mortality rate (%)	Mean weight gain (g)	Specific growth rate gday ⁻¹
Live feed (<i>D. magna</i>)	0.01	0.25 \pm 0.46	2.65 \pm 0.91	30.37	69.62	0.24	0.23
Chicken egg yolk	0.01	0.02 \pm 0.01	0.68 \pm 0.50	13	87	0.01	0.04
Soybean	0.01	0.01	0.1	1	99	0.00	0.01

The lack of change in development characteristics in the chicken egg yolk and soybean fed groups or artificial feed group could be due to the catfish larval being difficult to digest and use efficiently (Faruque et al 2010; Das et al 2012). As a result, catfish larvae required high-quality and abundant live zooplankton, such as *D. magna* (Faruque et al 2010).

4. CONCLUSIONS AND RECOMMENDATIONS

The culture conditions of *Scenedesmus* species had shown that best results of algae biomass growth could be achieved by using Guillard's F/2 media and NPSZn fertilizers in batch experiments under laboratory conditions. The abundance of *Scenedesmus* sp. was statistically insignificant in both of cultured media.

The *Scenedesmus* species were good candidate food for culturing *D. magna*. The live feed of *Daphnia* sp. was essential for African catfish larvae growth and survival rate within two weeks and could potentially replace the *Artemia* cysts because the fish larvae had shown fast growth and good body weight gain when compared with artificial feed of soybean. That means Fish larvae tend to use *D. magna* more efficiently than artificial food even if high mortality rate recorded. This artificial feed of soybean didn't fulfill all the requirements and resulted in poor growth and survival in small fish larvae. Thus, considering the mouth size gap of the fish larvae during observation of the experiment, little *D. magna* was a crucial live feed of African catfish larvae at an early stage. On the basis of the major findings of the research work reported here, the following recommendations are made. The mass culture of plankton may resolve the deficiency of live feed when catfish hatches in the laboratory. Smaller zooplankton (rotifer, *Moina* sp.) culturing experiment may be mandatory to resolve the ambiguous question of the mouth gap and ingestion of food for catfish larvae. To check the survival rate of catfish, watch a live feed with *Artemia* cyst. In addition to this according to this live feed, ingestion and the mouth size gap of the fish larvae should be observed.

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