E-ISSN: 2347-5129
P-ISSN: 2394-0506
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.549
IJFAS 2018; 6(4): 562-569

www.fisheriesjournal.com
Received: 18-05-2018
Accepted: 19-06-2018

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Effect of selected feeds, feeding frequency and density on growth and survival on mud Eel *Monopters cuchia* (Hamilton 1822) Larvae

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Abstract
The aim of the investigation was to determine the effect of different food on growth and survival of *Monopterus cuchia* larvae. Two experiments (Four types of feed as treatment were used for both study, three replications of each) was conducted for 21 days to assess the effect of different food (Zooplankton, Earthworm Pest, Small Fish Pest and Nursery Feed), feeding frequency and density on growth and survival of *M. cuchia* larvae in Tray condition. Once (Experiment 1) feeding frequency was two times daily and stocking density was 2 Larvae/litre (180 Larvae /tray) and another (Experiment 2) one feeding frequency was three times daily and stocking density was 1 Larvae/litre (90 Larvae /tray) of *M. cuchia* larvae. Experiment-2 showed significantly the best growth performance considering the feeding frequency and stocking density. The survival rate of *M. cuchia* larvae was also significantly influenced by feeding frequency and stocking density. Water quality parameters were more or less the same in both densities.

Keywords: *Monopterus cuchia*, stocking density, live feed, growth performance, Mud eel

1. Introduction
Bangladesh is very rich in water resources. Once the inland waters were rich with wild fisheries resources and *Monopterus cuchia* (Hamilton 1822) [1] was one of those. It is a freshwater air-breathing swamp mud eel locally known as kuchia or kuicha, belongs to the family Synbranchidae of the order Synbranchiformes [2]. Bangladesh the tribal people and a few of other castes eat this fish. It is commercially important due to its high demand for export outside the country. So, it is being caught indiscriminately from the natural waters and being exported. The fresh blood of cuchia is directly consumed to cure weakness, anemia, asthma. *M. cuchia* commonly occurs in the fresh water of Bangladesh, Pakistan, India and Nepal [2]. Before, it was abundant in the inland waters of Bangladesh; but in the recent years, its abundance is decreasing alarmingly due to indiscriminate harvest from nature. It is carnivorous and nocturnal in nature and prefers animal-based food like small fishes, mollusks and worms [3]. In Bangladesh it is commonly found throughout the country, plenty in mud holes in shallow beels and boro paddy fields particularly in Sylhet, Mymensingh and Tangail district [4]. Effect of temperature on food, growth and survival rate of freshwater mud eel, Monopterus cuchia during aestivation period and found that highest average feeding rate was found during 27°C (February and March) and lowest rate at the lowest average temperature (14.4 °C). *Monopterus cuchia* is being fully eradicated from the water bodies by using various pesticides or drying up water bodies before the culture of another target fish species. More than 8,000 fishers, traders, transporters and exporters are found to be involved in this sector [5]. The broods and breeding grounds of *M. cuchia* are decreasing day by day. As a result, it has become endangered in the natural waters of Bangladesh. If this situation continues to go on, in near future, there is a much possibility to find it extinct. To overcome this situation, research on breeding, nursing, culture techniques and survey on the availability of *M. cuchia* is necessary to ensure its conservation and rehabilitation. International Union for Conservation of Nature (IUCN) [6] has enlisted mottled *M. cuchia* in their red list of threatened fishes of Bangladesh as a vulnerable taxon. Few works have been reported on the larval growth and survival of this species [7, 19].

So, the development of a nursing technology of *Monopterus cuchia* larvae will contribute not only to our national economy but also help to protect endangered *M. cuchia* from extinction. The present study was conducted to evaluate the effect of selected feeds, feeding frequency and density on growth and survival% of *M. cuchia* in nursery system.

2. Materials and Methods

2.1 Study site

This study was conducted in still Tray at the hatchery complex in the campus of Bangladesh Fisheries Research Institute (BFRI), Floodplain Sub-station (FPSS), Santahar, Bogura, Bangladesh at the time of 2013-2014.

2.2 Experiments setup

A total 2 experiment was set up there to observe the effects of different foods on growth and survival of larvae and standardizes the fine-tuning of the nursing technique of *M. cuchia* larvae in the tray. Those are below-(Table-1)

Table 1: Experiments Objective

Experiment No.	Objectives	Study Period
Experiment-1	Effects of different foods on growth and survival of spawn of *M. cuchia* in tray	2013
Experiment-2	Fine tuning of nursing technique of *M. cuchia* in tray	2014

2.3 Experiments Duration

The experiment duration was 21 days long with10 days old cuchia larvae.

2.4 Larvae Source

M. cuchia larvae was produced in the pond of Floodplain Sub-station. Among the larvae, good quality was selected & stocked in the tray in June/2013 and 2014.

2.5 Preparation of tray

Twelve (12) trays were used for the experiment. The area of each tray was 0.75 m^2 and the depth of water was from 10-12cm. Experimental trays were made of the still sheet. Before releasing larvae, floor and sidewalls of the tray and were covered by smooth clay soil to create a suitable and natural environment for *M. cuchia* like as pond bottom. Water hyacinth was provided to create suitable shelter for the larvae. Continuous water flow was maintained in cisterns to make sure regular Oxygen circulation and proper water quality. Excess water passed out through an outlet after maintaining the mentioned volume of water.

2.6 Larvae stocking density selection and feeding frequency

Ten days old of *M. cuchia* larvae produced by the induced breeding technique using different Hormone doses having an initial length-weight and selected density for experiments 1 and 2 such as below-(Table-2)

Table 2: Stocking Density, Feeding Frequency and Initial Length (cm) & Weight (mg) of Two Experiments

Experiment No.	Initial		Stocking Density	Feeding Frequency (Day)
	Length (cm)	Weight (mg)		
Experiments 1	4.70±0.28	0.069 ± 0.01	2000/m^3 or 180 cuchia Larvae /tray (2 Larvae/litre)	2 time
Experiments 2	5.13±11	0.091±0.04	1000/m^2 or 90 cuchia Larvae /tray (1 Larvae/litre)	3 time

2.7 Treatment setup

Two experiment was conducted in four treatments (Each experiment) with zooplankton (T-1), earthworm juice (T-2), small fish pest (T-3) and nursery feed (T-4). Three replications for each treatment were made for better comparison.

2.8 Food supply and management

Feeding rate was adjusted at 50% - 20% of body weight. The growth in terms of length (cm) and weight (g) were recorded in seven days interval. Continuous water flow was maintained in) trays to make sure regular Oxygen circulation and proper water quality. Excess water passed out through an outlet after maintaining the mentioned volume of water. The cuchia larvae were considered satiated when they stopped feeding, though there were some feeds yet to be fed and assembled in the corners of the trays. The excess feed was removed before next feeding and dead larvae were removed and counted at that time.

2.9 Food collection and Perpetration

i) Zooplankton collection from ponds

Zooplanktons were collected from ponds of Bangladesh Fisheries Research Institute, Floodplain sub-station, Santahar, Bogra by standard drop count method (APHA, 1995)[8]. Replicate plankton samples were collected by means of a bucket (50 litters) and filtered through bolting silk plankton net of 25µ. In general, the smallest size of the main zooplankton groups are rotifers and just-hatched copepods, are important first foods for larval fish [9] so, the plankton net mesh size was selected at 25µ for collection the smallest zooplankton as a feed of *M. Cuchia*.

ii) Earthworm Collection from natural source

Earthworms were collected from the natural source of Bangladesh Fisheries Research Institute, (BFRI), Floodplain Sub Station (FPSS) campus in Santahar, Bogra, Bangladesh.

iii) Small Fish collection from natural Ponds

Small Fish were collected from ponds of Bangladesh Fisheries Research Institute, Floodplain sub-station, Santahar, Bogura by a fishing net.

iv) Nursery Feed collection from Feed Market

Nursery Feed was collected from the feed market for proximate analysis by the method of Association of Official Analytical Chemists (AOAC, 1980)[10] to detect the higher amounts of protein per cent for treatment T-4.

2.10 Determination of growth and survival

The larvae were offered the feeds three times for Experiment 1 and two times for Experiment 2 in a day by spreading method initially at the rate of 50% - 20% of the total biomass of larvae for the first to last weeks respectively. The dead

cuchia were removed as soon as they were detected. Ten cuchia larvae of the stocked fish in each tray were sampled at seven (7) days interval by using digital balance and graph paper. It was done in the morning before feeding. Length, weight, specific growth rate (%), weight gain, Percent Weight gain (%) and survival rate (%) were analyzed and recorded. Following formulas were used to determine the growth performance.

a) Weight gain (mg)
Mean final weight - Mean initial weight

b) Percent weight gain (%)
Mean final weight − Mean initial weight/Mean initial weight × 100

c) Specific growth rate (SGR)(mg/day)
{ln (FBW=Final live body weight (mg)–ln (IBW=Initial live body weight (mg)/D=Number of days } × 100

d) Percent of Survival (%)
(No. of fry alive / Total no. of fry stocked) × 100

2.11 Data analysis
The Statistical data were analyzed by DMRT (Duncan's Multiple Range Test) with one-way analysis of variance (ANOVA). Difference levels of significance were considered at an alpha of 0.05. It was performed by using SPSS statistical software package.

2.12 Water quality measurement
Physicochemical water quality parameters such as water temperature (ºC), dissolved oxygen (mg/l), pH, total alkalinity (mg/l), and ammonia (mg/l) were analyzed on the same day of sampling. A centigrade thermometer measured the temperature of water. HACH water test kit (Model-FF-2, USA) was used to measure pH, dissolved oxygen (DO), total alkalinity, and ammonia (NH3). Water quality of cistern was measured regularly.

3. Results

3.1 Proximate composition of selected Nursery Brand Feed
Higher amounts of protein-contained feed were used for treatment T4. Proximate compositions of selected Brand Nursery Feed are shown in Table 3.

Table 3: Proximate composition of the Brand Nursery Feed.

Sl. No.	Item of Feed	Experiment 1(2013)	Experiment 2 (2014)
		Composition (%)	Composition (%)
1	Protein	34.88%	32.96%
2	Lipid	15.99%	11.67%
3	Ash	17.43%	16.69%
4	Moisture	10.66%	11.44%

3.2 Determination of growth performance and survival
i) Experiment-1: Effects of different foods on growth and survival of larvae of *M. cuchia* in tray
The effect of food on growth and survival per cent of *M. cuchia* larvae was investigated in the present study. Four diets were tested during the period of 21 days feeding trial. At the termination of the feeding trial, it was observed that larvae fed with Earthworm pest showed better growth and survival rate. The growth pattern and survival of *M. cuchia* larvae fed with Zooplankton, Earthworm pest, Small fish pest, and Nursery Feed. The growth patterns of *M. cuchia* larvae in terms of length; weight and survival during 21 days of the experimental period are shown in Table 4.

Table 4: Effect of f different feeds, feeding frequency and density on the growth performance and survival of *M. cuchia* larvae for 21 days.

Experiment	Larvae/ tray		Treatment			
		Feed	Zooplankton (Treatment-1)	Earthworm pest (Treatment-2)	Small fish pest (Treatment-3)	Nursery feed (Treatment-4)
1	180	Initial Length (cm)	4.70±0.28	4.70±0.28	4.70±0.28	4.70±0.28
		Initial Weight. (g)	0.069±0.01	0.069±0.01	0.069±0.01	0.069±0.01
		Final Length (cm)	5.54 ± 0.24^{c}	5.56 ± 0.28^{c}	5.13 ± 0.28^{b}	4.87 ± 0.30^{a}
		Final Weight (g)	0.122±0.01	0.124±0.01	0.076±0.02	0.102±0.02
		Length Gain	0.84^{c}	0.86^{c}	0.43^{b}	0.17^{a}
		% Length Gain	17.87^{c}	18.30^{c}	9.15^{b}	3.62^{a}
		Weight gain (g)	0.053	0.055	0.007	0.033
		(%) Weight gain	76.6	79.7	10.14	47.8
		Specific growth rate (%)	1.18	1.21	0.46	0.81
		Survival%	91^{b}	92^{b}	80^{a}	82^{a}

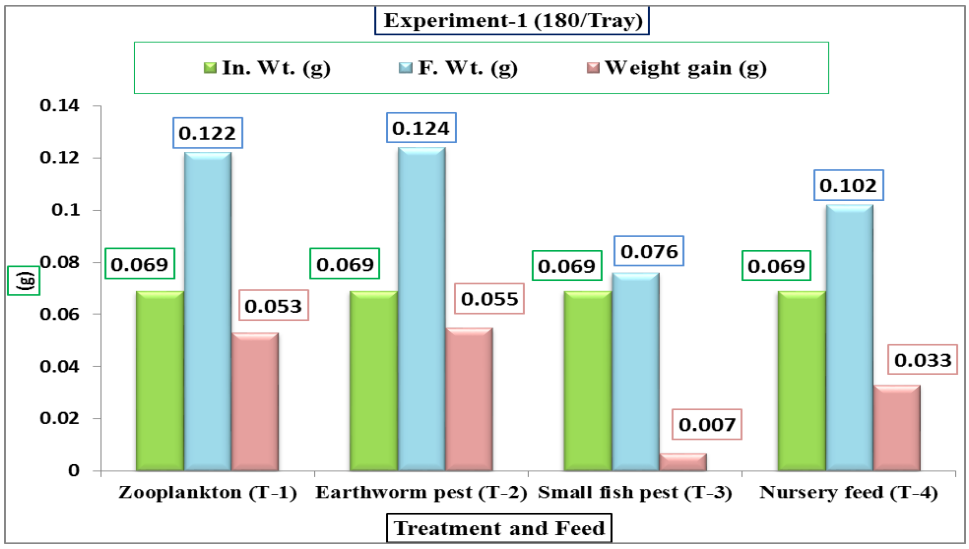

Fig 1: Weight (g) variation of *M. cuchia* Larvae at 180 Larvae/tray (Experiment-1)

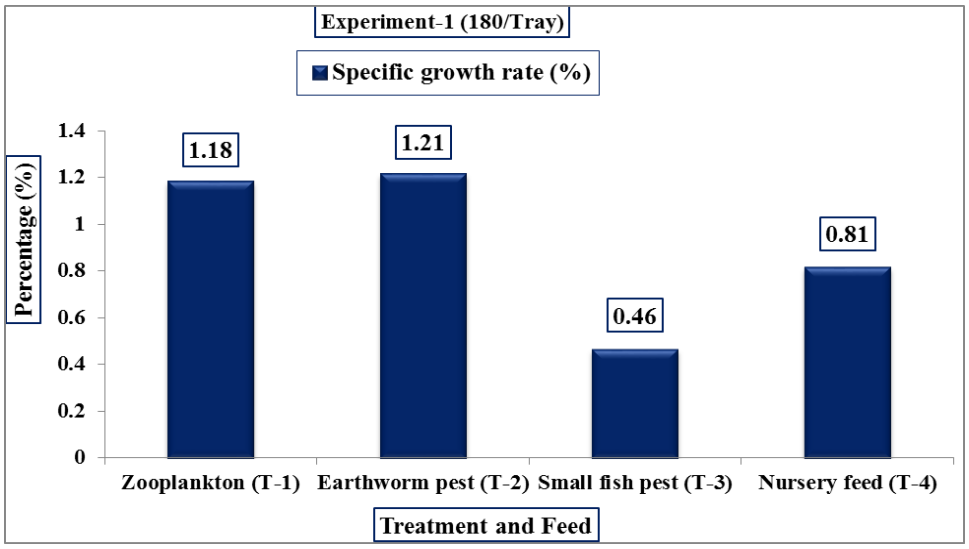

Fig 2: Specific Growth Rate (SGR%) of M. Cuchia larvae at 180 Larvae/tray (Experiment-1)

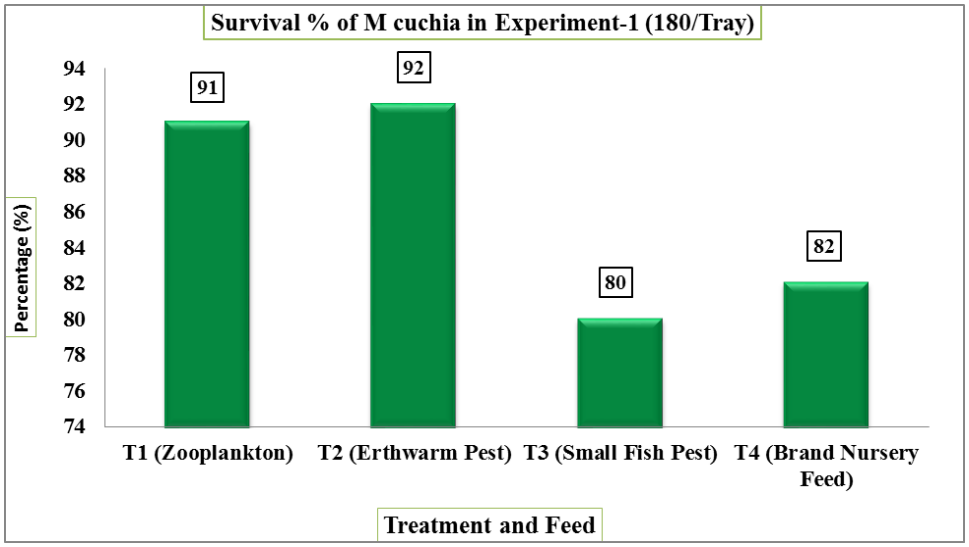

Fig 3: Survival rate (%) of *M. Cuchia* larvae at 180Larvae/tray (Experiment-1)

Among all the treatments, T-2 (Earthworm pest) showed significantly highest ($P<0.05$) growth performance in weight (0.124±0.01g), length (5.56±0.28^{c} cm) and the survival rate was 92%. T-3 (Small fish pest) showed the lowest growth performance in weight (0.076±0.02g), length (4.87±0.30 cm) and the survival rate was 80%. The weight gain attained by the larvae of T-2 (Earthworm pest) and T-1 (Zooplankton) were significantly better than T-3 (Small fish pest) and T-

4(Nursery Feed). In case of% weight gain, the larvae of T-2 (Earthworm pest) and T-1 (Zooplankton) showed significantly better than T-3 (Small fish pest) and T-4 (Nursery Feed) (Table 4 and Fig. 1, 2 & 3).

ii) Experiment-2: Fine tuning of nursing technique of *M. cuchia* in tray

The effect of food on growth and survival per cent of *M. cuchia* larvae was investigated in the present study. Four diets were tested during the period of 21 days feeding trial. At the termination of the feeding trial, it was observed that larvae fed with Earthworm pest showed better growth and survival rate. The growth pattern and survival of *M. cuchia* larvae fed with Zooplankton, Earthworm pest, Small fish pest, and Nursery Feed is presented in Table 5.

Table 5: Effect of different feeds, feeding frequency and density on the growth performance and survival of *M. cuchia* larvae for 21 days.

Experiment	Spawn/tray		Treatment			
		Feed	**Zooplankton (Treatment-1)**	**Earthworm pest (Treatment-2)**	**Small fish pest (Treatment-3)**	**Nursery feed (Treatment-4)**
2	90	Initial Length (cm)	5.13±.11	5.13±.11	5.13±.11	5.13±.11
		Initial Weight. (g)	0.091±0.04	0.091±0.04	0.091±0.04	0.091±0.04
		Final Length (cm)	8.58±0.38[a]	8.97±0.25[a]	8.17±0.51[a]	8.06±0.51[a]
		Final Weight (g)	0.606±0.04	0.618±0.03	0.590±0.07	0.579±0.06
		Length Gain	3.45[a]	3.84[a]	3.04[a]	2.93[a]
		% Length Gain	67.25[a]	74.85[a]	59.26[a]	57.12[a]
		Weight gain (g)	0.51	0.52	0.49	0.48
		(%) Weight gain	565.92	579.12	548.35	532.96
		Specific growth rate	9.03	9.13	8.90	8.81
		Survival%	93[b]	96[b]	90[b]	87[a]

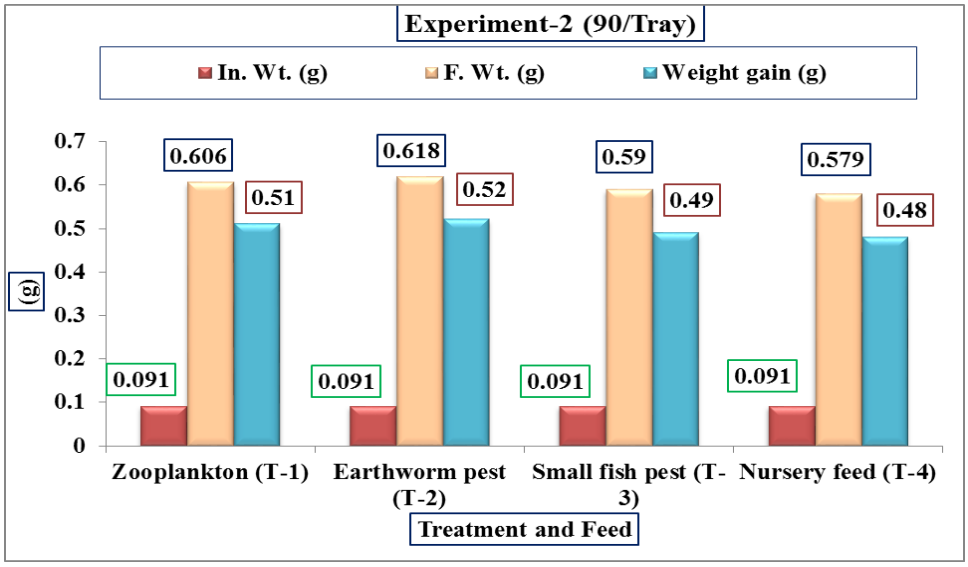

Fig 4: Weight (g) variation of *M. cuchia* Larvae at 90 Larvae/tray (Experiment-2)

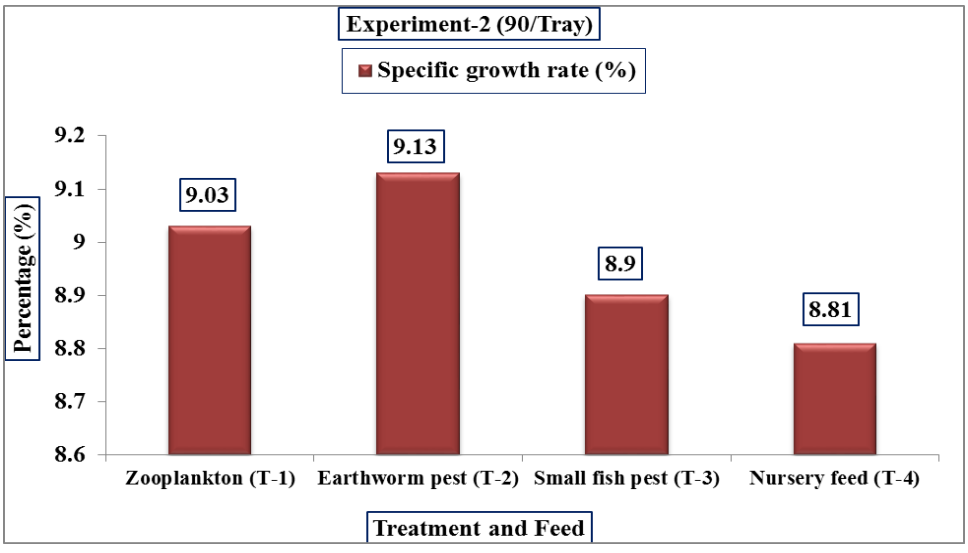

Fig 5: Specific Growth Rate(SGR%) of *M. Cuchia* larvae at 90 Larvae/tray (Experiment-2)

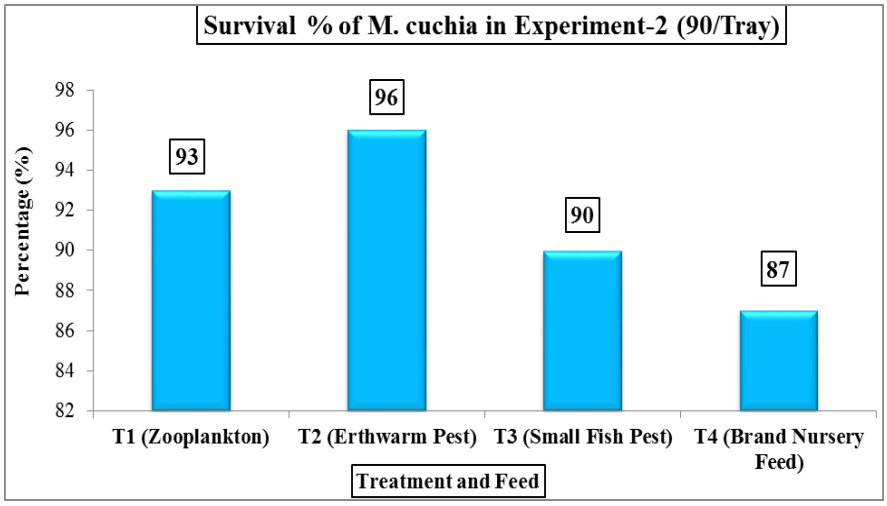

Fig 6: Survival rate (%) of *M. Cuchia* larvae at 90 Larvae/tray (Experiment-2)

Among all the treatments, T-2 showed significantly highest ($P<0.05$) growth performance in weight (0.618±0.03 g), length (28.97±0.25a cm) and the survival rate was 96%. T-4 showed the lowest growth performance in weight (0.579±0.06g), length (8.06±0.51a cm) and the survival rate was 87%. The weight gain attained by the larvae of T-2 and T-1 were significantly better than T-3 and T-4. In case of% weight gain, the larvae of T-2, T-1 and T-3 showed significantly better than T-4.

The Specific Growth Rate% of T-3 and T-4 had a significant difference. Significantly ($p<0.05$) highest survival rate was showed in T-2 than those of T-1. The growth patterns of M. cuchia spawn in terms of length; weight and survival during 21 days of the experimental period are shown in Table 4 and Fig. 4, 5 & 6).

3.3 Water quality measurement

The water quality parameters (Avg. ± SD) values obtained from the four (4) cisterns are given in Table 6. In the present study, Water quality parameters were more or less the same in both densities.

Table 6: Mean (±se) values of water quality parameters of different treatment.

Sl. No.	Water quality parameters	Experiment	
		Experiment 1 (180 Larvae/tray)	Experiment 2 (90 Larvae/tray)
1	Air tem. (^{0}C)	31.5	31
2	Water tem. (^{0}C)	29.28± 0.23	29.16± 0.26
3	pH	7.81± 0.54	7.86± 0.45
4	DO (mg/l)	6.30± 0.86	6.50± 0.84
5	Alkalinity (mg/l)	190.76± 2.33	191.50± 2.43

Fig 7-10: Ovservation of *M. Cuchia* larvae in Tray

4. Discussion

The final length of feed Earthworm pest under Experiment-2 (90 Larvae/tray and feeding frequency three times daily) was significantly higher than Experiment-1 (180 Larvae/tray and feeding frequency two times daily). Length gain, % length gain SGR (%) and survival (%) showed the same sequence in table 4 & 5. Here one thing remarkable that treatment 2 of both experiments (Experiment-1 & 2) showed the best performance considering all growth parameters. Water quality parameters in different treatments were observed more or less same in Experiment-1 and Experiment-2.

Saha *et.al.* (1998) [11] recorded that feeding frequency was two times daily during 20 days after hatching of *shing* larvae where best growth in length that was 12.3 mm. The author also showed when density was 5 larvae/litre best growth rate (%) was 107 and when density was 10 larvae/ litre best growth rate (%) was 106. The present study shows that when feeding frequency was two times daily during 21 days after hatching of cuchia spawn where best growth in length that was 5.56 cm when density was 1 spawn/ litre and best growth in length was 8.97 cm when feeding frequency was three times daily and density was 2 spawn/ litre.

Saha *et.al.* (1998) [12] showed that feeding frequency was three times daily during 27 days after hatching of *Magur* larvae where best growth in length that was 18.13 mm and density was 5 larvae/litre. Yasmin et.al. (1998) [13] found feeding frequency was two times daily for 33 days after the hatching of *Magur* larvae where best growth was in length 47.6 mm.

Islam *et.al.* (1998) [14] showed that feeding frequency was three times daily during 28 days after hatching of *hybrid magur* larvae where best growth in weight that was 0.639 g fed Tubifex species and density was 2 larvae/litre. The author said tubificid worm was found to be the best for the rearing of the *hybrid magur* larvae.

Present study shows that when feeding frequency was two times daily during 21 days after 10 days old hatchling of cuchia larvae fry where the best growth in weight that was 0.124 g when density was 2 larvae/litre (Experiment 1) and when density was 1 larvae/litre (Experiment 2) and feeding frequency was three times daily best growth was 0.618g in weight (Table 4 & 5 and Fig 1 & 4).

Narejo *et.al.* (2003) [15] found that the highest percentage weight gain was fed live small fish was 1223.44 followed by dead small fish and pellet feed was 152.32 & 85.57. Highest weight gain 71.20 followed by 46.46 and 26.10 when initial weight was 30.53 g for 12 months culture period. And survival% was highest was 76% followed by 70% and 53%.

For different fish species, the different result observed with respect to feeding frequency [16]. Feeding frequency twice per day was found to be appropriate for channel catfish, *Ictalurus punctatus* [17]; four times a day for himri barbell, *Barbus luteus* [18].

Begum *et al.* (2017) [7] observed that, after absorbing (12-15th, day) yolk sac of larvae, 120 days long experiment of M. Cuchia larvae, supplementation of three type foods (Earthworm pest, zooplankton, and chopped Tubifex) and stocking in between two rearing units (Cistern & Tray), Cistern unite are shown the highest growth and survival rate. There in-tray initial length and weight were 4.86±0.24 cm and 0.07±0.00g and final length and weight were10.68±1.89 and 1.09±0.02g. Survival rate and specific growth rate (%) were 2.29 and 80% respectively. There are growth and survival rate of *M. cuchia* larvae were fast in both studies [Begum *et al.* (2017) [7] and the present study]. Feed is essential for the growth of animals. High-quality feed provides superior growth and low quality of feed provides inferior. One thing is clear that fish larvae can be increased properly with suitable feed.

Finally, it is found that growth affected by feed, density and feeding frequency. The present study indicates that cuchia larvae can be reared successfully with live feed (Earthworm juice) than artificial feed. But collection and continuous adequate supply healthy earthworm are a problem.

Water quality parameter plays an important role in aquaculture. The physicochemical conditions of all treatments were good and provided an acceptable range for the growth and survival of *M. Cuchia* larvae.

5. Recommendations

1. A suitable culture technique should be developed for mass production of the healthy earthworm. While the artificial feeds gave poor growth and survival.
2. Further study under effective design needs to be conducted to increase growth and survival rate.
3. Feed selection is necessary to achieve better growth of *M. cuchia* larvae, so it needs live food or lives feed pest.

6. Conclusions

Among all experimental feeds, Earthworms shows higher growth. This research will help to indicate the suitable food for higher growth of *M. cuchia* larvae. It is assistive with confidence to say that, the *M. cuchia* larvae can be reared successfully fed with live or Live Feed pest. So the present study could make a view to evaluating the effect of selected feeds, feeding frequency and density on growth and survival% of *M. cuchia* in nursery system.

7. References

1. Hamilton F. Fishes of the Ganges. Archibald constable and company, Edinburgh, 1822, 96.
2. Jhingran AG, Tawler PK. Inland fisheries of India and adjacent countries. Oxford and IBH publishing co. Pvt. Ltd. Calcutta. 1991; 1:514.
3. Nasar SST. Backyard Eel Culture: International Institute of Rural Reconstruction, Silang, Cavite, Philippines, 1997, 88.
4. Rahman AKA. Freshwater fishes of Bangladesh. 2nd ed., Zool. Soc. Bangladesh. Dhaka, Bangladesh, 2005, 65.
5. Hasan MM, Sarker BS. Marketing channel and export potentiality of freshwater mud eel (*Monopterus cuchia*) of Noakhali region in Bangladesh, 2012.
6. IUCN Bangladesh. Red List of Bangladesh Volume 5: Freshwater Fishes. IUCN, International Union for Conservation of Nature, Bangladesh Country Office, Dhaka, Bangladesh, 2015, 136
7. Begum N, Pramanik MMH, Khan MH, Mahmud Y. Induced breeding attempt of vulnerable freshwater mud eel, *Monopterus cuchia* (Hamilton 1822). International Journal of Fisheries and Aquatic Studies. 2017; 5(2):188-194
8. APHA (American Public Health Association) 1995. Standard methods for the examination of water and waste water. 14th Ed., American Public Health Association. 1015 Eighteenth Street, N. W. Washington, D. C. 2036, 1995.
9. Ludwig GM. Zooplankton Succession and Larval Fish Culture in Freshwater Ponds. The Southern Regional

Aquaculture Center, United States Department of Agriculture, Cooperative States Research, Education, and Extension Service. SRAC Publication No. 700, 1999.
10. AOAC. Official methods of analyses of the Association of Official Analytical Chemists, Washington, D.C., USA, 1980.
11. Saha JK, Islam MA, Das M, Rahamatullah SM, Islam MS. Studies on the induced breeding and post-larval rearing of shing (*Heteropneustes fossilis* Bloch). Bangladesh J. Fish. Res. 1998; 2(2):139-144.
12. Saha MR, Mollah MFA, Roy PK. Growth and survival of *Clarias batrachus* (Lin.) Larvae fed on formulated diets Bangladesh J Fish. Res. 1998; 2(2):151-158.
13. Yasmin A, Mollah MFA, Haylor GS. Rearing of cat fish (*Clarias batrachus* Lin.) larvae with live and prepared feeds. Bangladesh J. Fish. Res. 1998; 2:145-150.
14. Aminul Islam M, Badrudujahan M, Begum N. Effects of different supplemental feed on the survival and growth of hybrid magur fry (*C. batrachus C. gariepinus*). Bangladesh J Fish. 1998; 21(2):93-98.
15. Narejo NT, Rahmatullah SM, Mamunur Rashid M. Effect of different feeds on growth, survival and production of freshwater mud eel, *Monopterus cuchia* (Hamilton). Indian J Fish. 2003; 50(4):473-477.
16. Chiu YN, Sumagaysay NS, Sashillo MAS. Effect of feeding frequency and feeding rate on the growth and feed efficiency of milkfish, *Chanos chanos* Forskal, juveniles. Asian Fish. Sci. 1987; 1:27-31.
17. Andrews JW, Page W. The effects of frequency of feeding on culture of cat fish. Trans. Amer. Fish. Soc. 1975; 104:317-321.
18. Gokcek CK, Mazlum Y, Akyurt I. Effect of feeding on the growth and survival of Himri Barbel *Barbus luteus* (Heckel, 18843), fry under laboratory conditions. Pak. J Nutr. 2008; 7:66-69.
19. Begum N, Pramanik MMH. Study on food, feeding habit and breeding biology of commercially important Cuchia species, *Monopterus cuchia*. BFRI Annual Report 9 (2008-2012), Bangladesh Fisheries Research Institute, Mymensingh 2201. 2012, 224-226.