



Study the production performance of climbing perch (Vietnamese Koi-*Anabas testudineus*) in dewatering canal at BAPARD campus, Gopalganj

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Abstract

The present study was carried to observe the production performance of Vietnamese koi (*Anabas testudineus*) in dewatering canal at BAPARD in Kotalipara Upazilla under Gopalganj district Bangladesh from October to December 2019. The fingerlings of 3.8 ± 0.04 cm and 0.5 ± 0.01 gm were stocked with three treatments (T_1 , T_2 and T_3) each with two replications. The stocking densities were 1000 in T_1 , 1200 in T_2 and 1400 fingerlings/dec in T_3 , respectively. Supplemental feeds (30% protein) were applied for the fish. SGR (%) value (5.24 ± 0.07) was recorded in T_1 and the lowest (5.08 ± 0.23) in T_3 . The survival rates were 64.73 ± 1.5 , 54.12 ± 1.7 and 50.50 ± 1.84 for T_1 , T_2 and T_3 respectively. The FCR was 1.50 ± 0.67 , 1.60 ± 0.14 and 1.78 ± 1.15 in T_1 , T_2 and T_3 respectively. The highest production was 36.05 ± 2.25 kg/dec in T_1 , followed by T_2 (34.35 ± 2.75 kg/dec) and T_3 (34.28 ± 3.65 /dec) respectively. The highest benefit or net return for T_1 Tk. 1624.50 /dec and BCR of 1.43 followed by Tk. 1124.50/dec and BCR value of 1.28 in T_2 and Tk. 452.00/dec and BCR value of 1.10 in T_3 .

Keywords: production performance, stocking density, Vietnamese koi, dewatering canal

1. Introduction

The climbing perch fish *Anabas testudineus* (Bloch) is one of the important freshwater small indigenous fish of Bangladesh [1]. It is locally known as koi. It is very popular for its delicious taste and flavor. It is found in paddy fields, haors, baors, ponds, swamps, marshes and canals. It can withstand harsh environmental conditions such as low oxygen, wide range of temperature and other poor water conditions [13]. The fish contain high values of physiologically available iron and copper essentially needed for hemoglobin synthesis [27]. In late 1980s, the number of this fish have drastically reduced from open waters due to environmental degradation, over fishing, use of large amount of pesticides, herbicides and fertilizers, destruction of suitable habitats, obstruction to breeding migration, poor management etc. In the face of diminishing natural population of climbing perch-planners, policy makers, aqua culturists, and fisheries biologists are thinking of its cultivation through intensive farming [11]. Indiscriminate destructive practices have caused havoc to aquatic biodiversity [15]. It contributes 1.4% in the total inland water fish production [12]. Recent studies suggest that worldwide 20 % of all fresh water species are extinct, endangered or vulnerable [23]. International Union of Conservation of Nature [16] enlisted *Anabas testudineus* as not threatened perch fish in Bangladesh. But due to rough and unplanned water management policy for irrigation, over exploitation, illegal practice of capture fisheries and various ecological changes in its natural habitat; this native species is threatened now [8]. Considering the importance of this species in nutritional, economics and biodiversity point of view, it is

required to develop an appropriate culture technique of *Anabas testudineus*. Keeping these in view, seed production technology through artificial propagation was developed in captive condition by the Bangladesh Fisheries Research Institute. But in culture aspects, the growth rate of native strain is very slow in ponds ecosystem [19]. To improve this situation, another variety of koi known as Vietnamese koi (*Anabas testudineus*) have been imported from Vietnam in 2013 by Sarnolata Agro Fisheries Ltd. Induced breeding was proved helpful to get the seeds at large scales. The seedlings thus obtained were used for rearing in ponds in different regions of the country. But to standardize the culture technology with a view to get maximum growth, yield and economic benefit experiments were conducted through a designed manner and the results are worthy for publication. Now a days farmers have been cultured this species with high stocking densities to earn more profit. But they have been unable to earn more profit. Some of problems (diseases, oxygen depletion, increase ammonia gas etc) have been occurred due to high stocking density. For this purpose this experiment has been undertaken to growth performance of Koi in dewatering canal. So that farmers achieve more knowledge about culture practices and obtain more profit.

2. Material & Methods

Dewatering canal selection and preparation

The experiment was conducted for a period of three months (90 days) from 16 October to 16 December 2019 in dewatering canal with six segments of length 40 ± 0.5 meter and width 1.5 ± 0.25 meter each with a depth of 1.00 meter at

BAPARD campus, Kotalipara, Gopalganj. Prior to stocking, dewatering canals were cleaned with bleaching powder and quick lime.

Experimental design

Three different stocking densities of Vietnamese koi (*Anabas testudineus*) were tested in the experiment. Stocking density was maintained as treatment and which replicated twice.

Source of fingerlings

The fingerlings of Vietnamese koi (*Anabas testudineus*) were used in this experiment were collected from a private hatchery of Jashore, Bangladesh.

Fish stocking

Fingerlings of Vietnamese koi (*Anabas testudineus*) were stocked in 16 October 2019, according to the experimental design.

Fish sampling

Random sample of ten fishes from each dewatering canal was sampled fortnightly by using a scoop net. The total weight was measured by using a portable electronic balance (Tanita, Japan).



Fig 1: Pictorial view of sampling for Vietnamese koi (*Anabas testudineus*)

Feeding

After stocking, in order to meet up the increasing dietary demand, commercial fish feed named Nourish Feed (Nursery-2 to Grower) containing average 30% crude protein were applied as supplementary feed at the rate of 3-10% of standing biomass of fish twice daily.



Fig 2: Pictorial view of feed that applied in study area

Water sampling and analysis

Physico-chemical parameters of pond water were monitored every 15 days interval between 9.00 AM to 10.00 AM. Water temperature was recorded using a Celsius thermometer and transparency (cm) was measured by using a Secchi disc of 20 cm diameter. Dissolved oxygen and pH were measured directly using a digital electronic oxygen meter (YSI, Model 58, USA) and an electronic pH meter (Jenway, Model 3020, UK). Total alkalinity was determined by titrimetric method [6]. Total ammonia of water samples was determined with the help of a Hach Kit (Model DR 2010, USA).

Harvesting of fish

At the end of the experiment, the fishes were harvested by removing water from canal. The harvested fishes were counted and weight was recorded.

Data analysis

Data were analysed using the SPSS Version-20. ANOVA was performed on all the dependent variables to see whether the treatment had any significant effect or not. An economic analysis was carried to estimate the net profit from different treatments. The analysis was based on local market prices for harvested fish and all other items. The costs of fingerlings,

lime and supplemental feeds are shown in Table 3. The net return was measured by deducting the gross cost from the gross return per decimal. The benefit cost ratio was also measured as a ratio of net benefit to gross cost.

3. Result

Water quality parameters

Water quality parameters like air temperature, water temperature, water pH, dissolved oxygen, ammonia, transparency and total alkalinity were observed at 15 days interval throughout the study period (Table. 1).

Table 1: Water quality parameters observed during the experimental period.

Parameters	Treatments		
	T ₁	T ₂	T ₃
Air temperature (°C)	29.83±1.95	29.11±1.86	30.88±2.63
Water temperature (°C)	29.94±1.70	30.16±1.35	30.33±1.37
Water pH	7.75±1.00	7.63±0.85	7.39±1.26
DO (mg/L)	4.21±1.70	4.10±1.34	4.10±0.70
Ammonia (mg/L)	0.25±0.05	0.25±0.10	0.50±0.25
Total alkalinity(m/L)	213.66±26.73	277.00±90.32	258.22±62.32
Transparency (cm)	28.50±0.45	30±0.25	31.50±0.35

Production Performance



Fig 3: Pictorial view of Vietnamese koi (*Anabas testudineus*)

Table 2: Details of stocking, growth, FCR, SGR and production of Vietnamese koi (*Anabas testudineus*) in the three treatments during the study period are shown in Table 2.

Parameters	Treatments		
	T ₁	T ₂	T ₃
Stocking densities (No. /Dec.)	1000	1200	1400
Initial Length (cm)	3.8±0.04	3.8±0.04	3.8±0.04
Initial Weight (gm)	0.5±0.01	0.5±0.01	0.5±0.01
Culture duration (days)	90	90	90
Final Length (cm)	14.40±1.70	14.05±1.84	13.50±1.90
Final weight (gm)	55.70±2.50	52.90±3.49	48.50±4.12
Survival rate (%)	64.73±1.5	54.12±1.7	50.50±1.84
FCR	1.50±0.67	1.60±0.14	1.78±1.15
SGR (%)	5.24±0.07	5.18±0.05	5.08±0.23
Production (Kg/Dec)	36.05	34.35	34.28

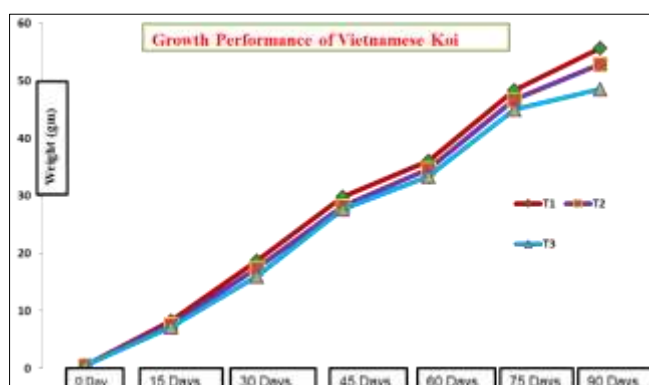


Fig 1: Growth Performance of Vietnamese Koi (*Anabas testudineus*)

Table 3: Economic analysis for Vietnamese koi (*Anabas testudineus*) production in ponds reared for 90 days

Components	Treatments		
	T ₁	T ₂	T ₃
Expenditure (Tk. /Dec.)			
Fingerlings cost	1000.00	1200.00	1400.00
Feed cost	2703.00	2748.00	3050.00
Lime cost (15 Tk/kg)	80.00	80.00	80.00
Medicine	-	-	160.00
Total expenditures (Tk/dec.)	3783.00	4028.00	4690.00
Income			
Gross return (Tk/dec.)	5407.50	5152.50	5142.00
Net return (Tk/dec.)	1624.50	1124.50	452.00
BCR (Benefit Cost Ratio)	1.43	1.28	1.10

Sale price of Vietnamese koi = Taka 150.00/ kg

Commercial feed= Taka 50.00/ kg

4. Discussion

In the present study water quality parameters like air temperature, water temperature, water pH, soil pH, DO (dissolve oxygen), ammonia, transparency and total alkalinity were recorded and assessed. It was found that water temperature were T₁ (29.83±1.95 °C), T₂ (29.11±1.86 °C) and T₃ (30.88±2.63 °C) which report was similar [5, 21, 23, 24, 26]. The range of water temperature from 26.06 to 31.97°C is suitable for fish culture [4]. The water pH value of three treatments were T₁ (7.75±1.00), T₂ (7.63±0.85) and T₃ (7.39±1.26). The pH from 6.5 to 9.0 is suitable for pond fish culture and pH more than 9.5 is unsuitable to fish production [28]. Different authors have reported a wide variation in pH from 7.18 to 7.24 [21], 7.03 to 9.03 [26], 6.80 to 8.20 [5] and 7.50 to 8.20 [7] in fertilized fish ponds and found the ranges to be productive. The DO (dissolve oxygen) was recorded 4.21±1.70, 4.10±1.34 and 4.10±0.70 mg/L in the treatments T₁, T₂ and T₃, respectively, which was similar [21, 24, 25, 28]. The variations in total alkalinity in all the treatments were found in productive range for aquaculture ponds [3, 20, 22, 28]. The transparency was recorded during the experimental period was 28.50±0.45 cm, 30.00±0.25 cm and 31.50±0.35 cm in the treatments T₁, T₂ and T₃, respectively.

The growth rates of *Anabas testudineus* under different stocking densities are shown in Table 2. SGR (%) in treatment T₁ (5.24±0.07) was significantly higher than T₂ (5.18±0.05) and T₃ (5.08±0.23) (Table 2) respectively. There was no significant difference (>0.05) among the different treatments. The average values of SGR (%) of Vietnamese koi were observed as 2.59%, 2.56% and 2.56% in treatments T₁, T₂ and T₃ respectively [2]. The highest survival rate (%)

was observed in T_1 (64.73 ± 1.5), T_2 (54.12 ± 1.7) and T_3 (50.50 ± 1.84), respectively. There was a significant variation (<0.05) in the survival rate in *Anabas testudineus* among different treatments (Table. 2). It was more or less similar with the findings ^[14, 21]. FCR was comparatively higher in treatment T_3 (1.78 ± 1.15) than T_2 (1.60 ± 0.14) and T_1 (1.50 ± 0.67) respectively (Table 2) however, more or less similar ^[9, 10, 18]. The average production of koi fish was 36.05 ± 2.25 , 34.35 ± 2.75 and 34.28 ± 3.65 kg/dec in the treatment T_1 , T_2 and T_3 , respectively. The growth rate in treatment T_1 was higher than treatment T_2 and T_3 indicated lower density can produce the maximum size of table fish with minimum size variation which has the similarity with the findings of some authors ^[17, 21]. The highest production was observed to be 25 kg/dec/90 days in treatment T_3 , 22 kg/dec/90 days in treatment T_2 and the lowest production was observed to be 18 kg/dec/90 days in treatment T_1 at stocking densities 150, 250 and 350 fries/dec and designated as treatment T_1 , T_2 and T_3 respectively ^[2].

The total expenditures production was higher in T_3 (4690.00 Tk/dec) lower than T_2 (4028.00 Tk/dec) and T_1 (3783.00 Tk/dec). The net return generated from 90 days culture period was calculated as 1624.50 Tk/dec, 1124.50 Tk/dec and 452.00 Tk/dec for T_1 , T_2 and T_3 respectively. The highest net profit of BDT 1624.50 Tk/dec was obtained from T_1 where *Anabas testudineus* stocked in 1000 individuals/dec similar ^[2]. The highest benefit or net return for T_1 Tk. 1624.50 /dec and BCR of 1.43 followed by Tk. 1124.50/dec and BCR value of 1.28 in T_2 and Tk. 452.00/dec and BCR value of 1.10 in T_3 . The benefit cost ratio was 1.7, 1.63 and 1.56 in T_1 , T_2 and T_3 respectively ^[2].

5. Conclusion

The present study indicated that comparatively highest production was found in treatment T_1 which received lower stocking density (1000 fish/dec). From the research it might be suggested that the farmers should maintain stocking density. The more study will be needed to production performance of Vietnamese koi in dewatering canal.

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