Effect of density on growth condition of climbing perch

The Effect of Density on Growth Condition of Anabas Testudineus

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CHAPTER 1

INTRODUCTION

1. 1BACKGROUND OF STUDY

Climbing perch or ikan puyu or betuk (*Anabas Testudineus*) (Bloch, 1792) is a freshwater species that is commonly found in paddy fields, wells, irrigation channels and in drains. Climbing perches are fishes that are able to travel short distances across the land in search of new water sources or food. Although Thai Climbing Perch has been described as omnivorous, it has a tendency toward carnivorousness (Besra, 2000). Climbing perches are kept for consumption and also for companion animals. This study is to study the effect of stocking density on the growth condition of the climbing perch (*Anabas Testudineus*) and the best stocking density suitable to maximize the growth of the climbing perch (*Anabas Testudineus*). To get the exact growth rate of climbing perch, several densities are used, such as 2 fishes/tank, 4 fishes/tank, 6 fishes/tank and 8 fishes/tank. The future extension of this study is the researcher hypothesized that a standardized stocking density of *Anabas Testudineus* can be used to maximize the growth rate of the *Anabas Testudineus* thus increasing the quality of the currently available *Anabas Testudineus* in Malaysia. Climbing perch can become a backbone to the increasingly aquaculture industry as one of the main sources of protein to the human consumption as the tilapia and carp are currently ranked top of the most fishes cultured in Malaysia.

1. 2PROBLEM STATEMENT

Since climbing perch are not being cultured and reared commercially in Malaysia, the optimum stocking density of climbing perch is remain unknown for human consumption. Therefore, the rearing of climbing perch under different stocking density is the most suitable method to investigate the most optimum density that the climbing perch can gain most weight on the shortest duration.

One of the concerns and issues related to the climbing perch is the availability of the climbing perch for commercial consumption in Malaysia. The climbing perch are not deemed as one of the favourites for the consumption due to its acquired taste and also small in size.

1. 3OBJECTIVES

The objectives of the experiment are as follows:

1. To study the effect of different stocking densities on the growth condition of climbing perch (*Anabas Testudineus*) from different aspects such as from the live weight, survival rate and appearances.
2. To examine the best stocking densities suitable to maximize the growth of climbing perch (*Anabas Testudineus)*

HYPOTHESIS OF THE STUDY

H_0 = There will be a decrease in the growth condition of climbing perch as the stocking density increase.

1. 4SCOPES OF THE STUDY

The scope of the research is as follows:

1. Only local species ikan puyu (*Anabas Testudineus)* will be studied in the laboratory.
2. Only one commercial feed were given to the fishes without any additional supplements will be given
3. The research will be conducted in 2 months' time.

1. 5LIMITATIONS OF STUDY

Since the culturing of the *Anabas Testudineus* from the hatching is quite consuming, the *Anabas Testudineus* on juvenile stage and forward will be used in the research.

Other limitations of the study are that the difficulty of observing the fishes due to its behaviour and size. To solve the limitations, aquaculture tanks will be used instead of ponds so that the fishes can be observed more carefully and more precise results can be obtained.

1. 6SIGNIFICANCE OF STUDY

Overall, this research can be used for the determination of the optimum density suitable for rearing the climbing perch (*Anabas testudineus*) that have the maximum growth rate. Other than that, this research can be used as an aspect in determining the standardization of the density required to rear the climbing perch at optimum rate and size. In the future study, this research can be used to rear the climbing perch on larger and commercial scale that can produce and harvest a larger amount of fish that can ultimately support the current consumption of the climbing perch.

CHAPTER 2

LITERATURE REVIEW

2. 1NUTRITIONAL VALUE OF CLIMBING PERCH

According to Wimalasema et. al (1995), climbing perch has edible flesh of approximately of 40. 1±9. 4 grams from its overall weight of 140 grams, moisture content of 70 grams, carbohydrate percentage of 4. 4 %, lipid percentage of 8. 8 %, protein content of 14. 8 %, ash percentage of 0. 7± 0. 4 %, potassium content (mg/g%) of 272. 2 mg/g% ± 57. 8 mg/g%, sodium content (mg/g%) of 60. 5 mg/g% ± 8. 5 mg/g%, calcium content (mg/g%) of 410 mg/g%, phosphorus content (mg/g%) 390 mg/g% and iron content (mg/g%) of 1. 4 mg/g%.

The moisture, carbohydrates, proteins, lipids and ash contents of marine fish are reported as 66 – 84 %, 0 – 2. 9 %, 15 – 20 %, 0. 1 – 20 % and 0. 8 – 2 % respectively (Wimalasema et. al, 1995). When the data is compared, climbing perch has quite high percentage of moisture, carbohydrates, proteins, lipids and ash contents. This can be used to substitute or replace the demand of marine fish and may provide better nutrient value for money spent.

2. 2TAXONOMY OF CLIMBING PERCH *Anabas Testudineus*

The classification order of the climbing perch genus, *Anabas Testudineus* are as follows:

Kingdom: Animalia

Phylum: Chordata

Class: Actinopterygii

Order: Perciformes

Family: Anabantiade

Genus: Anabas

Species: Anabas testudineus (Bloch, 1792)

Figure 1: Taxonomy of climbing perch

2. 3EFFECTS OF NUMBERS OF CLIMBING PERCH *Anabas Testudineus*

According to the Khatune et. al (2012), stocking density is related to the volume of water or surface area per fish. Increase in stocking density results in increasing stress, which leads to higher energy requirements, causing a reduction in growth in growth rate and food utilization. It is directly related with the competition for food and space (Rahman et al. 2008d, 2010; Rahman & Verdegem 2010). Generally, fish needs to compete less for food and space in lower stocking density than the higher stocking density. The present study provides empirical evidence on the effects of Thai climbing perch stocking density on its growth and survival, where they (growth and survival) were higher in ponds with lower stocking density than the ponds with higher stocking density. There are no previous studies comparing the effects of Thai climbing perch density on its growth and survival in aquaculture ponds. However, Suresh & Lin (1992) reported decreasing

growth of tilapia *Oreochromis niloticus* (Linnaeus 1758) with increasing stocking density. Similar effects of stocking density on survival and growth observed in a wide variety of fish species (Huang & Chiu 1997; Imsland et al. 2003; Irwin et al. 1999; Rahman 2006; Rahman & Verdegem 2007; Rahman et al. 2008a).

According to Khatune et. al (2012), the harvesting weight of climbing perch of 350, 400, and 550 individuals per decimals are 90. 03±0. 04 grams, 87. 73±0. 95 grams and 84. 15±0. 49 grams respectively. The harvesting length of climbing perch of 350, 400, and 550 individuals per decimals are 14. 95±0. 07 cm, 14. 30±0. 28 cm, and 13. 55±0. 0 cm respectively.

2. 4CULTURINGCLIMBING PERCH (*Anabas Testudineus*) WITH OTHER BREED OF FISH

Mondal et. al (2010) found that Thai Climbing Perch can be cultured along with other fishes such as tilapia and still showed a high survival rate and growth rate. It is suitable to kept Thai Climbing Perch in cage and other fishes outside the cage compared to the conventional mixed culture system in the same pond without the cage. This is due in the conventional culture system, interspecies and intra-specific competition occurred for food between Tilapia and Thai Climbing Perch that resulted lower growth of Thai Climbing Perch.

Culturing Thai Climbing Perch with other species in caged perch system is also more beneficial as it reduces the overall operational cost and increases the net return even though the initial cost for cage is high due its small size, followed by mixed culture and lowest net profit for caged Tilapia.

2. 5CULTURING OF CLIMBING PERCH UNDER DIFFERENT CULTURE SYSTEMS

According to Kumar et. al (2013), A. testudineus was found to be highest in pond compared to cage and tank, indicating fastest growth under pond environment, although no significant variation was observed among the different systems. The slopes in all the culture systems were found to be significantly lower than critical isometric value, indicating negative allometric growth; the species becomes leaner as the length increases. Kumar et. al (2013) also noted that environmental factors highly influence the growth performance of an organism.

2. 6IDENTIFICATION OF MALE AND FEMALE OF CLIMBING PERCH (*Anabas Testudineus*)

According to Perera et. al (2013), they noted that the sexual dimorphism in *Anabas testiduneus* does not distinctly appear, however, it is practically possible during the breeding season. The identification of male and female can be done on the basis of some external features. Male climbing perch are body coloured and darker while females have slightly brighter body colour. Males are slender in appearance while female have swollen abdomen or girth that is distended with the ovary development. When the males are pressed gently on the abdomen, they eject milt while female eject yellowish eggs. Female have greater distance between the base of the pectoral fins than the length of ithmus compare to the male which has lesser length. In the breeding season, the female exhibits a prominent bulge at the vent that resembling genital papilla where the male lack such appearance.

2. 7BREEDING BEHAVIOUR OF CLIMBING PERCH (*Anabas Testudineus*)

Bhuyan et. al (2014) cited that the adults of Anabas testudineus are solitary and aggressive. In nature, the eggs are scattered in open water at the onset of the rains without any nest. The male wraps itself in the female body, fertilizing the eggs as they are laid. Each time 200 colourless eggs are released until about 5000 numbers are laid. The fecundity varies from 5000-35000 numbers. The eggs rise to the surface and float. The eggs hatch in 24 hrs and the fry are about 2-3 mm long. They are free swimming within two days of hatching.

In case of artificial breeding with pituitary or synthetic hormone, a single dose of injection for both the male and female spawning actively and courtship behaviour starts after 6 hrs of injection. The water temperature to be maintained is at 28 ^{0} C + 1 ^{0} C. Fertilized eggs float in the surface of water. It takes 18-19 hours for hatching after spawning and newly hatches larvae measures 1. 9-2. 0 mm in length without any movement. Yolk sac completely absorbs on third day after hatching and settles at the bottom. Egg custard, plankton and Artemia are supplied as artificial feed for those fries up to 20-25 days. The survivability varies from 70-75%.

3. 8SALINITY TOLERANCE OF CLIMBING PERCH (*Anabas Testudineus*)

According to Chotipuntu et. al (2010), they found that eggs successfully hatched in salinities up to 4. 5 ppt. In higher salinities hatching dropped and met the lethal median concentration at 5. 1 ppt. No hatch was observed in salinities beyond 7. 5 ppt. This suggests that a salinity of 4. 5 ppt is a threshold concentration for hatching viability of climbing perch eggs. The unsuccessful hatching of freshwater eggs in saline water may result from

various factors such as a reduction in activity and viability of sperm due to the inhibition of sperm-activating substances. Salt contained in media may also cause chemical changes in the eggs that triggers releasing of a developmental block or generates irreversible changes that prevent fertilization. Fry of climbing perch were found to tolerate higher salinity than larvae and eggs. Chotipuntu et. al (2010) also found growing the climbing perch in salinity of 6 – 7 ppt to obtain the best growth. Brackish water ponds of salinities up to proximately 11 ppt are utilizable for climbing perch culture. Brackish water ponds of salinities levels up to proximately 4 ppt are practical for spawning and nursing of climbing perch.

CHAPTER 3

MATERIALS AND METHODOLOGY

3. 1 TYPE OF MATERIALS USED IN THE RESEARCH

1. 90 climbing perch (*Anabas testudineus*)
2. 15 aquaculture tanks (3 ft. x 3 ft. x 3ft.)
3. 1 weighing scale
4. Commercial feed pallet
5. River water
6. Mesh net
7. Multi-parameter kit

3. 2 ORIGIN OF THE CLIMBING PERCH (*Anabas testudineus*)

All the climbing perch (*Anabas testudineus*) will be obtained and supplied from the cultured climbing perch from the villagers from Cherang Ruku, Pasir

Putih, Kelantan. All the fishes will be selected according on their length of the body and stage of production. All the fishes will have the initial range of weight from 16 to 50 grams for both male and female with accepted difference in weight of 10 grams to 20 grams.

3. 3EXPERIMENTAL DESIGN

The research will have four different treatments with three replications for each treatment. The treatments will be 2 fishes/tank, 4 fishes/tank, 6 fishes/tank, and 8 fishes/ tank. This will enable the researcher to determine the best density of the climbing perch to gain the most live weight and the largest size on a small scale. The experiment will take two months or eight weeks. The temperature, and light period will be specific during the research period where the designated temperature is at room temperature and light period is 12 hours. The water of the tanks will be changed every week. Kiambang will be placed in the tanks. The tanks also will be closed with lid with a hole made that enable the exchange of gas occurs and also to prevent the climbing perch from escaping. The ammonia level is also regulated.

3. 4EXPERIMENTAL METHOD

The climbing perch will be placed in smaller aquaculture tanks according to the predetermined numbers. Juvenile climbing perch will be feed twice a day using formulated feed where the feed had been weighted by the weighing scale where the feed given is 3% of body weight. The climbing perch’s live weight will be measured using weighing scale for two months with interval of one week of each weighing. The live weight and survival rate of the climbing

perch will be recorded into the datasheet. The data will be analysed and evaluated.

CHAPTER 4

EXPECTED RESULT

For the climbing perch, the smallest stocking density will have the largest weight gain. There will be an increase of mortality weight as the stocking density increases. There will be an increase of ammonia level and turbidity level as the stocking density increases. The smallest stocking density will have the longest length in the body measurement while the largest stocking density will have the shortest length in the body measurement. Analysis of the data will be calculated using the SPSS software and the ANOVA will be calculated using the same software.

GANTT CHART

Month	MAR ‘ 15	APR ‘ 15	MAY ‘ 15	JUN ‘ 15	JUL ‘ 15	AUG ‘ 15	SEP ‘ 15	OCT ‘ 15	NOV ‘ 15
Selecting research title									
Writing research proposal									

Selecting fish to

study

Presentation of

proposal

Submission of

research proposal

Preparing the

equipment for

research

Conducting

experiment

Analysing data

Finalizing the thesis

Submission of thesis

REFERENCES

Pal, M. & Chaudhry, S. 2010. *Anabas testudineus* . The IUCN Red List of Threatened Species. Version 2014. 3. . Downloaded on24 March 2015.

Chotipuntu, P., & Avakul, P. (2010). Aquaculture potential of Climbing Perch, Anabas testudineus, in Brackish Water. *Walailak J. Sci.& Tech.* , *7* (1), 15–21.

Kumar, K., Lalrinsanga, P. L., Sahoo, M., Mohanty, U. L., Kumar, R., & Sahu, a K. (2013). Length-weight Relationship and Condition Factor of Anabas testudineus and Channa Species under Different Culture Systems, *5* (1), 74–78. doi: 10. 5829/idosi. wjfms. 2013. 05. 01. 64201

Mondal, M., Shahin, J., Wahab, M., Asaduzzaman, M., & Yang, Y. (2011). Comparison between cage and pond production of Thai Climbing Perch (*Anabas testudineus*) and Tilapia (*Oreochromis niloticus*) under three management systems. *Journal of the Bangladesh Agricultural University* , *8* (2), 313–322. doi: 10. 3329/jbau. v8i2. 7943

Zalina, I., Saad, C. R., Rahim, a. a., Christianus, a., & Harmin, S. a. (2011). Breeding Performance and the Effect of Stocking Density on the Growth and Survival of Climbing Perch, Anabas testudineus. *Journal of Fisheries and Aquatic Science* . doi: 10. 3923/jfas. 2011. 834. 839

Perch, C., & Bloch, A. (2004). Effect of Different Feed on Larval / Fry Rearing of, *36* (1), 13–19.

P. A. C. T. Perera, K. A. H. T. Kodithuwakku, T. V. Sundarabarathy & U. Edirisinghe (2011), Captive Breeding of *Anabas testudineus* (Climbing Perch) under Semi-artificial Conditions for the Mass Production of Fish Seed for Conservation and Aquaculture, Insight Ecology Journal, DOI: 10. 5567/Ecology-IK. 2013. 8. 14

Sonmoina Bhuyan, Dipanjan Kashyap& B. Kalita, Seed production of Climbing perch (*Anabas testudineus)* through Natural and Induced breeding,

Retrieved fromhttp://aquafind. com/articles/Production-of-Anabas-testudineus. php