__Original Research Article__

DISTRIBUTION OF DISSOLVED ORGANIC MATTER FROM FERMENTATION CHICKEN WASTE TO CLIMBING PERCH (*Anabas testudineus* Bloch) LARVAE VIABILITY

ABSTRACT

The objective of this research was to study about climbing perch (Anabas testudineus Bloch) larvae viability on removal of exogenous food by distribution of dissolved organic matter from fermentation of chicken waste. Completely randomized design with 4 treatments and 6 replicates was used in this research. Application dissolved organic matter was 250 mL/aquaria (A), 500 mL/aquaria (B), 750 mL/aquaria (C), and without dissolved organic matter (D). The data is analyzed using analysis of variance (Anova), and Duncan's Multiple Range Test (DMRT). Larvae survival rate for all treatments was very low. Each reached 0% in days 9 and 10 for treatment A and B. For treatment C and D in day 8. Anova result indicated that dissolved organic matter had significant effect (P<0.05) to absolute growth of larvae. DMRT test showed that each treatment had significant difference, except treatment C to D had no difference. The best growth for this research was treatment B.

Keywords : Climbing perch, Dissolved organic matter, chicken waste

1. INTRODUCTION

South Kalimantan has a very wide coverage of wetlands, especially swamps. Based on *updating* the potential swamp area in South Kalimantan, it is 1,101,681.9 ha, consisting of 576,652.9 ha of tidal swamps and 525,029.0 ha of lebak swamps (Mawardi *et al.* 2019 *in* Masganti, *et al* , 2020). One of the potentials of swamp waters with important economic value is the diversity of germplasm of swamp fish (Marlida and Elrifadah, 2017). Climbing pearch (*Anabas testudineus* Bloch) or commonly known by the Banjar people as 'iwak climbing pearch one of the most popular swamp fish, because of the delicious taste of the meat with a compact flesh structure. Currently, meeting the needs for climbing pearch consumption in South Kalimantan still depends on catches in nature. However, continuous fishing, especially in a destructive way, will of course have an impact on the availability of Papuan fish in natural waters.

Cultivation of specific local commodities of climbing pearch has a very important and promising economic potential. The success of climbing pearch farming is basically very dependent on hatchery technology and larval rearing. The transition phase from endogenous feed (yolksac) to exogenous feed is a very critical phase for the survival of climbing pearch larvae (Marlida, 2001). In the larval phase, extensive morphological and functional differentiation occurs, including the digestive system which has not been able to function optimally. In general, larvae up to one month old will experience a very high mortality of up to 80% (Huet, 1994), while natural feed inputs such as *Artemia* can only be consumed after the larvae are 7 days old (Marlida, et al., 2022). Larvae in the early phase of life after absorption of egg yolk need feed that is in accordance with their digestive ability, because physiologically in this phase the enzymes responsible for the digestive process are still limited. Besides that, the ability of the larvae to get the initial food according to the opening of the mouth is also very dependent on the availability of natural food in the cultivation container.

According to Rathore *et al* (2016), the larval phase is a very vulnerable phase due to physiological and metabolic conditions, so it is important to design its dietary requirements. While Viegas (2019), explains that the effect of nutrition has a very strong influence on larval development. This insufficiency affects the quality and health of the fish which causes an increase in morphological abnormalities, abnormal behavior and mass mortality of the larvae (Takeuchi, 2013; Reyes-Mero *et al* , 2022), as well as digestive tract degeneration which causes low efficiency of feed utilization and feeding activity (Reyes -Mero *et al* , 2022).

The use of dissolved organic matter in aqueous media during the life of the larvae can be a solution in overcoming high mortality. This ability is based on three things, namely: (1) the ability of the larvae to absorb and utilize dissolved organic matter in the media through the surface of the skin by means of simple diffusion (osmose), known as the 'Putter' theory (Hemming and Buddington, 1988); (2) dissolved organic matter along with water can be absorbed by fish through the gills and lateral line (Lin and Arnold, 1982); and (3) absorbed through the mucosal cells in the "buccal cavity" or during the process of osmoregulation (Blaxter, 1969). The use of dissolved organic matter in the form of glucose has been tried for the larvae of *Oxyelotris marmorata* , *Anabas testudineus* (Sulfiadi, 2015) and *Clarias gariepinus var* . (Adriani *et al* , 2019).

Until now, the nutritional needs of larvae have only been partially identified and much is still unknown (Kolkovski, 2013). The nutritional needs of climbing pearch larvae after the yolk has been absorbed requires a comprehensive study. One way is to utilize organic matter contained in the maintenance media. Experiments on the use of dissolved organic matter from fermented chicken manure are important as an effort to increase the survival of climbing pearch larvae in early development.

2. RESEARCH METHOD

Organic Material Preparation

The organic material prepared for this experiment was fermented fresh chicken manure with the help of microbes fermenting soil organic matter. The fermented microbes used are mixed cultures of microorganisms which mostly contain *Lactobacillus* , yeast, photosynthetic bacteria, *Actinomycetes* , and cellulose-degrading fungi from mixed cultures that have been circulating in the market under the trade mark EM4, *Effective Microorganism* 4.

Parent Spawning and Hatching Eggs

The broodstock that had matured gonads of 6 females and 18 males were selected from the brood pond located in Barabai (± 117 km from Banjarbaru). The weight of the female parent ranged from 57.50 ± 2.50 g, while the male parent ranged from 22.50 ± 2.50 g.

Spawning was carried out using the stimulated massage method by injecting the hormone ovaprim (Syndel corp. Canada, product code. 13430) intramuscularly. The female parent was injected 2 times with an injection interval of 6 hours, and the male parent was injected 1 time simultaneously with the injection of the two female parents. The dose of ovaprim used is 0.50 mL/kg body weight. Spawning was carried out in an aquarium measuring 75 x 40 x 50 cm filled with 125 L of water. The rearing medium was disinfected with 1 ppm methylene blue. The ratio of males and females is 1: 1 in terms of body weight. The aquarium is aerated at medium speed.

Maintenance and Treatment of Larvae

The biomass of the parrot fish larvae used as the test fish was taken from the results of egg incubation in controlled aquariums and media. Eight aquariums for larval rearing were prepared measuring 60 x 30 x 30 cm which were partitioned into 3 so that the number of aquariums used as containers for the treatment media was 24, with a volume of 5 L of water. 25 kg and given 2.5 L of water while aerating, this condition is left for 2 days. After 2 days the subgrade was taken for initial observation of benthos density, while plankton density was observed by taking water samples. Sediment samples and water samples were taken from 4 treatment aquariums randomly. The water in the aquarium was then added until it reached a volume of 5 L. The dissolved organic matter was then added according to the treatment. Treatment was repeated every 1 week, until the study ended. The maintenance medium was disinfected with 1 ppm methylene blue (Untergasser, 1989). The density of larvae applied was 20 individuals/L.

Water quality was measured every day especially for temperature, pH, and dissolved oxygen, while ammonia (NH_3) was measured at the beginning and end of the study. Measurement of temperature, pH and dissolved oxygen using a thermometer, pH meter and DO meter *respectively there.*

Observation and Sampling

The viability of betok fish larvae can be observed through indicators of the ability of the larvae to survive and grow well.

a. Climbing pearch larvae survival rate

The survival rate was determined visually by calculating the number of live fish based on the number of dead larvae at each observation. Observations of dead larvae were carried out twice a day, in the morning at 07.00 – 08.00 WIT and in the afternoon at 16.00 – 17.00 WIT by observing the surface of the water to see dead larvae that had floated. Water aeration is turned off during activities, so that observations are easier and more accurate.

The calculation of the survival rate is guided by Effendi (1997) with the formula:

$$SR=\frac{Nt}{Ni}\ x\ 100\%$$

Where:

SR = Shortcut

N_t = Number of betok fish larvae at time t

N_i = Number of parrot fish larvae at the beginning of the experiment

b. Larval growth

The growth power of larvae is calculated based on the growth rate which is expressed as the increase in length which is determined by the absolute growth formula (Ricker, 1979):

$$G = Lt - Lo$$

G = growth
Lt = length of betok fish larvae at time t
Lo = length of the parrotfish larvae at the beginning of the study

Plankton abundance

Observation of plankton abundance was carried out by filtering aquarium water using a 50 µm plankton net. Identification of plankton was carried out according to the identification method of Nedham and Nedham (1962). Calculation of plankton abundance was carried out using the random enumeration method with the formula:

$$N = n\ x\ \frac{A}{B} x \frac{1}{c}$$

Where :
N : total amount of plankton (individual/L)
n : the average total number of individual plankton in each field of view
A : Volume of filtered water or collected in bottle sample (mL)
B : The volume of water below glass cover (1 drop = 0.05 ml)
C : filtered water volume (liters)

Draft Test

Draft experiment used _ For know viability of parrotfish larvae through survival parameters and larval growth is Draft Random Complete (CRD), with 4 treatments and 6 replications . Dissolved organic matter applied was 250 mL/aquarium (A), 500 mL/aquarium (B), 750 mL/aquarium (C) and without adding organic matter (D). The layout of the experimental container is arranged randomly. To test the hypothesis, a test of variance (ANOVA) was carried out. To find out the difference in the mean value of the treatment, Duncan's real range test was used (Gaspersz, 1991).

3. RESULTS AND DISCUSSION

A. Viability of the Larvae of the Betok Fish (*Anabas testudineus* Bloch)

The viability of the parrotfish (*Anabas testudineus* Bloch) larvae during the study period was observed through indicators of the ability of the larvae to survive or the level of survival and ability to grow properly. The survival rate of larvae for all treatments was very low. In treatments A and B, 0% respectively on day 9 and 10 while C and D, on day 8. For more he explained can seen in Figure 1 below .

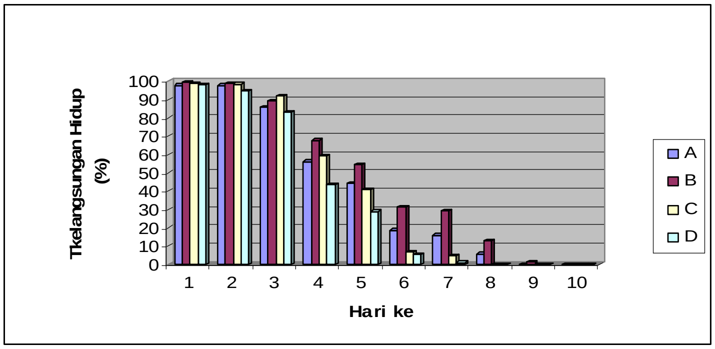

Figure 1. Survival Rate (%) of parrotfish (*A. testudineus* Bloch) larvae

From the research results obtained it turned out that dissolved organic matter was able to maintain larval viability above 60%, until the third day of the study period for all treatments. A drastic decrease in the survival rate of the larvae occurred on the 4th day and so on or when the larvae were 7 days old. Based on the results of Rini Marlida's research (2001) for larvae that were treated without feeding, the survival rate decreased by 54.08% when the larvae were 5 days old.

Based on the data obtained, it appears that the addition of dissolved organic matter from fermented chicken manure into the media cannot guarantee that the larvae can survive for a long time. When there is a drastic decrease in the survival rate, it is an indication that the larvae already need nutrients other than dissolved organic matter for their physiological functions, such as the synthesis of enzymes, hormones, and the formation of new tissues. Rathore *et al* (2016) explained that the susceptibility of larvae is closely related to the appropriate nutritional needs and the difficulty faced is identifying the need for feed composition due to limitations in physiological and metabolic functions. Likewise, according to Viegas (2019) basic knowledge regarding larval nutrition is still very limited and the effects of nutrition at the start of development are very strong. Insufficient nutrition in the larval phase affects the quality and health of fish, including increasing morphological abnormalities and mortality (Takeuchi, 2013).

In this study it is clear that dissolved organic matter from fermented chicken manure plays a role in maintaining the survival rate of the betok fish larvae up to 7 days old, especially in the post-yolksac phase until 7 days old is the most critical period for the parrot fish larvae because the larvae can only consume feed. natural types of phytoplankton, new larvae can consume artemia and other zooplankton after 7 days old (Rini Marlida, 2001). Thus, to maintain the survival rate of the larvae to remain high, apart from adding dissolved organic matter from fermented chicken manure to their living media, it is also necessary to provide natural feed.

The results of the absolute growth average obtained for each treatment were treatment A of 0.28 mm, treatment B of 0.4 mm, treatment C of 0.14 mm and treatment D of 0.02 mm. The absolute growth value for each of these treatments is very small, this is because the larvae cannot make the most of dissolved organic matter and natural food is not available in sufficient quantity. Data regarding larval growth can be seen in Table 1.

Table 1. Average growth in absolute length of betok fish (*A. testudineus* Bloch) larvae during the study.

No.	Treatment	Average Larval Length (mm) Day to					Growth Absolute (mm)
		1	3	5	7	9	
1.	A	2.62	2.73	2.92	2.90	2.90	0.28
2.	B	2.60	2.75	2.90	3.00	3.00	0.4
3.	C	2.60	2.63	2.70	2.74	-	0.14
4.	D	2.58	2.60	2.58	2.60	-	0.02

The results of ANOVA absolute growth of betok larvae showed that the administration of dissolved organic matter had a very significant effect on the absolute growth of betok fish. Based on the results of Duncan's multiple area test, the mean mean values for each treatment were highly significant, except for treatment C to D which was not significantly different.

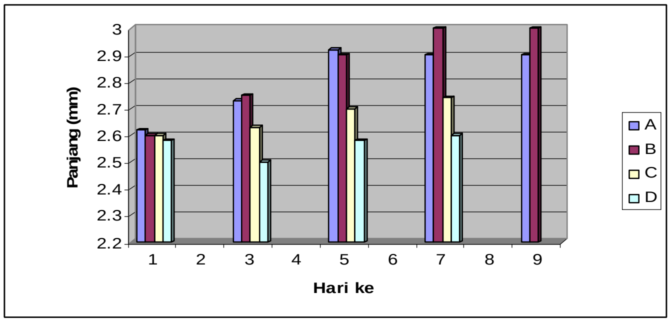

Figure 2. The average increase in length of betok fish (*Anabas testudineus* Bloch) larvae

From the research results obtained, it turns out that the administration of dissolved organic matter cannot guarantee growth (see Figure 2). After the egg yolk and oil grains have been completely absorbed, it turns out that the larvae are not utilizing natural food. The addition of dissolved organic matter into the media aims to make the larvae use it before eating natural food, but the dissolved organic matter cannot meet the energy needs of the larvae until the end of rearing. The lack of energy for body maintenance and growth is then taken from the energy stores in the body, causing the larvae to become thinner. According to Watanabe (1988), that if the larvae do not get the appropriate amount of feed for their activities and survival, then the body's tissues will be catabolized as an additional food needed.

Plankton and Benthos abundance

There were 9 types of plankton detected from all treatments. Of the 9 species, all of them were from *bacillariophyceae,* each of which had 2 species that dominated each treatment. In treatment A, the dominating plankton were *Eunotia narjeli* with 94 cells/L, and *Amphiprora* sp 88 cells/L. In treatment B and C, the dominating species was *Amphiprora* sp. respectively 85 and 25 cells/L and *Cymbella* sp. 47 and 40 cells/L, respectively. Treatment D was *Gymatopleura* sp.25 cells/mL and *Eunotia narjeli 21* cells/L *.*

Judging from the amount of plankton detected, the availability of plankton in the aquarium was minimal. The lack of phytoplankton in the rearing medium caused the larvae to lack natural food, which was thought to be the cause of the death of the larvae in all treatments. According to Stroband and Dabrowski (1979), the use of natural food earlier allows the larvae to have better digestibility, because natural food contains digestive enzymes.

Water quality

The results of water quality measurements show a safe range for fish life. Temperatures ranged from 25.5 – 28.0, DO at brood acclimation, spawning and hatching ranged from 6.7 – 7.10, only in treated aquariums the DO range was at a critical point of 1.8 – 2.4. It is suspected that the decomposition of organic matter at the bottom of the aquarium absorbs a lot of oxygen, so that the presence of DO is one of the causes of the death of the larvae. The addition of aeration was not much help in providing dissolved oxygen.

4. CONCLUSION

The survival rate of larvae for all treatments was very low. In treatments A and B, 0% respectively on day 9 and 10 while C and D, on day 8. From the research results obtained it turned out that dissolved organic matter was only able to maintain larval viability above 60%, until day three study periods for all treatments. A drastic decrease in the survival rate of the larvae occurred on the 4th day and so on or when the larvae were 7 days old. Based on the research results, the best growth value in this study was the B treatment. The plankton detected was of the Bacillariophyceae type.

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