EFFECTIVENESS OF SPREADING DENSITY ON LIVING AND GROWTH OF TILAPIA FISH (*Oreochromis niloticus*) SEEDS IN EMBER FISHING SYSTEMS (BUDIKDAMBER)

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ABSTRACT

This study aims to determine what stocking density is effective for cultivation using the budikdamber system. Budikdamber is a combination of fish and plant cultivation. This study used tilapia seeds and kale plants. The research was conducted in September - November 2022. The method used is an experimental method with a completely randomized design (CRD) that uses 5 treatments and 4 replicates. The treatments used were different stocking densities of 10 tails/70 L,20 tails/70 L, 30 tails/70 L, 40 tails/70 L and 50 tails/70 L. The parameters observed included fish and kale growth. The results showed that the stocking density of 20 tails/70 L was able to produce high growth and survival of 87.38%. And the best kale growth was produced at a stocking density of 50 tails/70 L.

Keyword: - *Budikdamber, Tilapia, stocking density, survival, growth.*

1. INTRODUCTION

Budikdamber or fish farming in a bucket is a combination of fish farming and plants. Basically, budikdamber activities are almost the same as aquaponics, except that budikdamber does not take up space so that even on narrow land budikdamber can still be applied. According to (Purnaningsih *et al*. 2020) The use of fish species in this budikdamber varies, such as catfish, tilapia, carp, catfish and also sepat fish. For the type of plant, you can use kale, spinach, mustard greens, pakcoy and lettuce. According to Suroso and Antoni (2017) kale plants are more widely chosen because they have advantages that are easy to cultivate, low prices, and also fast to harvest. Tilapia is a native fish originating from the Nile river and has been widely cultivated in Indonesia. FAO (2020) shows that tilapia production in 2018 reached 1.12 million tons or around 31.94% of Indonesia's total aquaculture. Tilapia is one of the freshwater commodities that has high economic value. Tilapia is very popular with the Indonesian people because tilapia meat has a savory taste and does not have many thorns. The success of fish farming activities in buckets (budikdamber) is determined by several factors, one of which is fish density. According to (Sihite *et al.* 2020) in cultivation activities, the stocking density will affect the growth of fish because there will be competition in taking oxygen and feed. In addition, high stocking density affects water quality which decreases, due to the large amount of residual feed and feces produced.

2. RESERCH METHOD

2.1 Material Tools

The tools used are such as, fiber tubs, 20 buckets with a size of 80 L, 160 beverage cups for plant containers, hydroton to replace planting media, aerators, solder, rakes, thermometers, pH meters, DO meters, ammonia test kits, digital scales, and rulers. The materials used are tilapia fish obtained from the Cibiru Fish Seed Center (BBI Cibiru), kale plant seeds and commercial feed.

2.2 Method

The method used was experimental with a completely randomized design (CRD) using 5 treatments and 4 replicates. The treatments used were different stocking densities of 10 tails/70 L water, 20 tails/70 L water, 30 tails/70 L water, 40 tails/70 L water, and 50 tails/70 L water.

2.3 Procedure

The buckets used were 20 pieces that could hold as much as 20 L of water. The buckets were washed before use and then filled with 70 L of water. The kale seeds were sown first for ± 10 days and then put into the beverage cup. Tilapia seeds are stored in a fiber tub first before beinginserted into the research container for ± 3 days so that tilapia seeds can adapt after that put tilapiaseeds into the bucket according to the treatment, namely 10 tails/70 L of water, 20 tails/70 L of water, 30 tails/70 L of water, 40 tails/70 L of water, and 50 tails/70 L of water. Fish were kept for 40 days.

2.4 Data Analysis

Data on survival, daily growth rate, and Feed Conversion Ratio were analyzed by ANOVA (F- test) at the 95% confidence level. If significantly different results were obtained, it was continued with the Duncan test at the 95% level to compare values between treatments. Meanwhile, water quality was analyzed in a comparative descriptive manner.

3. RESULTS AND DISCUSSION

3.1 Specific Growht Rate

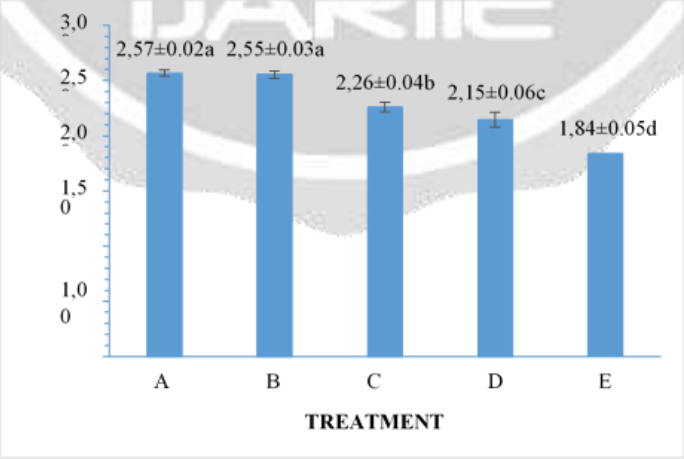

Fig -1: SGR of Tilapia

The figure above shows the highest daily growth rate of tilapia is shown in treatment A (10 tails /bucket) with an SGR value of 2.57 ± 0.02% but these results are not significantly different from treatment B (20 tails / bucket) and the lowest is shown in treatment E (50 tails / bucket) with an SGR value of 1.84 ± 0.05%. Based on the

observation of the SGR value, it indicates that the low stocking density provides space that can be utilized by fish and feed competition also becomes lower so that it can have an impact on tilapia growth. According to Tanody and Tasik (2023) fishreared in buckets using plants provide better growth performance when compared to fish reared intarpaulins. This happens because in the budikdamber system the fish are kept with plants, where kale can function as a biofilter. Kale plants are able to absorb and utilize ammonia waste produced during fish rearing activities so that water quality is better maintained.

3.2 Food Conversion Ratio

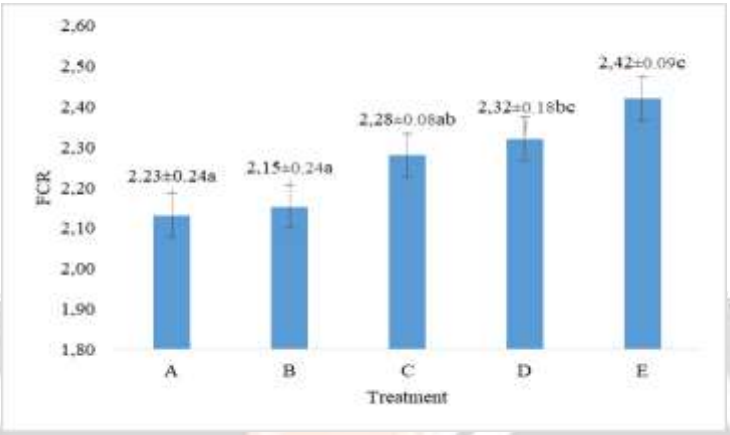

Fig -2: FCR of Tilapia

The lowest FCR value was found in treatment A (10 tails/bucket) which was 2.13 and the highestwas in treatment E (50 tails/bucket) 2.42. According to Ihsanudin (2014), a low FCR value meansthat feed utilization for growth is very efficient. This is due to the relatively large appetite patternof fish so that the need for feed used for growth is met. The FCR value in this study increased withincreasing density, indicating that higher density levels affect feed efficiency to be lower.

3.3 Survival Rate

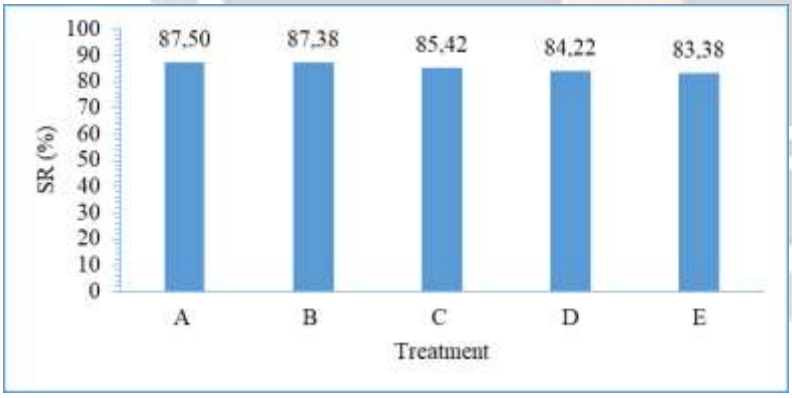

Fig -3: Tilapia survival rate

The best survival rate was found in treatment A (10 tails/bucket) 87.50% and B (20 tails/bucket) 87.38% while the lowest was found in treatment E (50 tails/bucket) 83.38%. According to Mulyani*et al.* (2014) the percentage of survival rate in fish if the Survival Rate (SR) is more than 50% is classified as a good category, the percentage of fish survival ranging from 30-50% is classified asa medium category and if the survival rate of fish is less than 30% it is classified as a bad category.The survival rate in this study ranged from 83-87%, these results indicate that the survival rate oftilapia cultivated with budikdamber system belongs to the good category. Fish mortality in this study is thought to be due to fish still adapting to the environment and feed given.

3.4 Water Quality

Treatment	Water Quality Parameters			
	Temperature (^{o} C)	DO (mg/L)	pH	Ammonia (mg/L)
A	22 - 23	5.3 - 6.4	6.33 - 7.25	0.012-0.014
B	21 - 23	5.1 - 6.4	6.35 - 7.01	0.017-0.019
C	21 - 22	4.9 - 6.2	6.23 - 6.94	0.022-0.034
D	21 - 23	4.25 - 6.0	6.14 - 6.89	0.056-0.068
E	21 - 23	4.2 - 5.8	6.25 - 6.90	0.093-0.98
Quality Standard SNI 7550:2009	25 - 32	$\geq$ 3	6.5 - 8.5	< 0.02

Tab -1: Water Quality of Tilapia Fry Rearing Media

The water temperature at the time of fish rearing has a value ranging from 21-23^o C and for waterpH has a value of 6.14-7.25. Where the optimal temperature according to SNI standards is 25-32^{o}C and the optimal pH according to SNI standards is 6.5-8.5 temperature and pH of this water stillhas a value below the SNI standard range. The DO value during maintenance has a value ranging from 4.2-6.4 mg / l, this value is in accordance with the DO value reference in SNI where the SNIstandard shows that for the maintenance of tilapia seeds a minimum of 3 mg / l is required. Ammonia value at the time of maintenance ranged from 0.012-0.093, while according to SNI standards the level of ammonia value that is good for tilapia seed growth is less than 0.02.

3.5 Kale Growth

The growth of water spinach in the budikdamber media shows good results this can be seen from the growth of stem length, the number of leaves and roots. However, the growth of water spinach treatment E is faster than the growth of water spinach in other treatments, this is due to the high stocking density so that the water spinach plants get sufficient waste which is then absorbed and used as fertilizer for growth. This is reinforced by the opinion of Ngirfani and Puspitarini (2020) that the roots of kale plants can grow well by absorbing waste that can cause water pollution. Thisis because kale plants are classified as aquatic plants that can absorb waste which is then used as fertilizer for growth.

4. CONCLUSIONS

The stocking density of tilapia in the budikdamber cultivation system of 20 tails/70 L is the most effective stocking density compared to other stocking density treatments, because it is able to produce high growth rate values and for the best kale growth is produced by the treatment of 50 tails/70 L because it is able to produce high plant stem growth, wide and green leaves.

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BIOGRAPHIES

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