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THE EFFECT OF GIVING PROBIOTICS FROM PROCESSED BANANA STEMS TO INCREASE THE SURVIVAL OF PANGAS CATFISH SEEDS IN THE TRANSPORTATION PROCESS

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Abstract

The high mortality or death during the transportation process is caused by the fact that catfish fry are stress-prone fish and have fast metabolism. Handling the problem of high mortality in the process of transporting catfish seeds requires alternative probiotics from banana stems because banana stems contain saponins, flavonoids, alkaloids, and tannins. This study aims to determine the effect of giving probiotics from processed banana stems to increase the survival of catfish seeds in the 6-hour transportation process, the study used a randomized block design (RBD) with 4 treatments, namely giving fermented banana stem probiotics (T1), banana stem probiotics without fermentation (T2), commercial probiotics (T3), without probiotics (C) with 3 repetitions. The results showed that giving banana stem probiotics had an effect based on the ANOVA test of 0.00 <0.05 and in Duncan's test there was a significant difference in each treatment. In the study the effect of probiotics was seen from the still ideal water quality, fish behavior during the transportation process and survival rate (SR). SR of each treatment was (T1) 90%, 86%, 84%, (T2) 98%, 98%, 96%, (T3) 88%, 90%, 84% , (C) 20%, 28%, 20%. Giving probiotics from processed banana stems without fermentation (T2) had the best effect on the survival of catfish seeds in the transportation process.

Keywords: Banana Stem Probiotics, Catfish Seeds, Survival

1. INTRODUCTION

Mortality or death rate is a parameter used in the population dynamics of a living thing to account for the loss of a living thing due to death, while survival or survival rate is the level of survival and must reduce the mortality rate. Catfish seed is a living creature that has a high mortality rate during the transportation process. This is due to the high activity of fish and their metabolism resulting in an increase in ammonia and a decrease in dissolved oxygen (Do) content in the water of the transport medium (Jhingran & Pullin, 1985). Furthermore, catfish seeds in the transportation process are very vulnerable to stress which causes death.

Efforts to transport catfish seeds from one place to another have been carried out frequently, but the survival rate for catfish is still low, so it is necessary to provide certain substances that can support and increase the survival rate for catfish during the transportation process. These substances are probiotics. Giving probiotics in the transportation process is by adding it to the transportation media

One of the alternative probiotics in the transportation process is banana stems. Banana stems contain chemicals such as saponins, alkaloids, flavonoids and tannins. This chemical substance is efficacious as preventing fish stress during the transportation process, increasing

survival, immunity to disease, improving water quality and when added to fish feed can increase appetite.

Banana plants are plants whose vegetation is dominant in wetland areas, especially in South Kalimantan. When bananas bear fruit, banana stems are usually cut down and left to rot on their own, even though banana stems have potential as probiotics. Banana stems were chosen because they have several advantages such as banana stems that are easy to find, easy to manufacture, do not incur large costs compared to making other similar probiotics.

In this study processed banana stems have the potential to be used as probiotics. Therefore, researchers want to know the effect of giving probiotics from processed banana stems to increase the survival of catfish seeds in the transportation process.

2. RESEARCH METHOD

The research was conducted in a mixed type (quantitative-qualitative) with experimental and observational techniques. This study used a randomized block design (RBD) which consisted of 4 treatments and 3 repetitions. The treatment in this study consisted of:

a. T1 = Giving probiotics from processed fermented banana stems with a dose of 5 ml.
b. T2 = Giving probiotics from processed banana stems without fermentation at a dose of 5 ml.
c. T3 = Administration of extra biotic brand market probiotics with a dose of 5 ml.
d. C1 = without giving probiotics.

Observation techniques were carried out to systematically observe and record the behavioral symptoms of catfish fry during the transportation process and the survival rate (SR).

The experimental technique is to test the quality of water. The water quality parameters tested were water pH, dissolved oxygen (DO), temperature, and the ammonia (NH3) test. The quality test is measured before the transportation process and after 6 hours of the transportation process.

The data obtained will be carried out by Analysis of Variance (ANOVA) using a Randomized Block Design (RBD) at a 95% confidence level to determine the effect of the treatment being tried. If there is a significant difference in the analysis ($P < 0.05$), then Duncan's multiple area test is performed to find out which treatment has the most significant effect so that the best treatment results are obtained (Nugroho et al., 2019).

3. RESULT AND DISCUSSION

The transportation process in the study took 6 hours of travel, namely round trip Banjarbaru-Banjarmasin-Marabahan and the distance covered was 172 km. The process of transporting over long distances uses a closed system, in which the transportation medium is in the form of a plastic bag filled with water and oxygen and then tied tightly with rubber. In this study the size of catfish seeds had a body length of 4 cm and a weight of 6 grams. The density of fish in one transport medium is 50 fish. In the process of transporting fish carrying out activities and metabolism, the higher the activity and metabolism, the more waste products of fish metabolism such as carbon dioxide and NH3 (ammonia). The waste products of metabolism at high concentrations are toxic to fish which can lead to stress and

death. Moreover, catfish seeds have a high mortality rate during the transportation process (Arfah & Supriyono, 2002).

Handling so that the problem of high mortality in the process of transporting catfish seeds requires treatment in the form of giving probiotics. Probiotics are supplements in the form of live microbial cells that have an effect on supporting the survival of host animals that consume them through balancing the microbial flora (Khotimah & Harmilia, 2016). However, probiotics can also be obtained from plants that contain substances such as saponins, flavonoids, alkaloids, tannins, and these substances can be obtained from banana stems. This chemical content is good for preventing fish stress during the transportation process, increasing survival, immunity to disease, improving water quality and when added to fish feed can increase appetite (Anggraini, 2016).

The probiotic content of banana stems contains saponins which work as antibacterial and have anti-inflammatory activity (Suharto et al., 2012). Flavanoids are a class of secondary metabolites produced in banana stems because they belong to the polyphenol group of plants. Flavonoids are efficacious as antioxidants, anti-inflammatory and antimicrobial. Flavonoids act as antioxidants by donating hydrogen atoms and in the form of glucosides. Flavonoids also have antimicrobial activity by inhibiting nucleic acid synthesis, inhibiting cell membrane function and inhibiting energy metabolism. Alkaloids are active substances in banana stems which function as drugs and strong activators for catfish seed immune cells that can destroy pathogenic fungi, bacteria and viruses. Tannins on banana stems which have an astringent taste act as an antiseptic.

The process prior to transportation begins with harvesting the catfish seeds from the pond and transferring them to a large aquarium, then sorting the catfish seeds and placing them in 4 containers. The T1 container will be filled with fermented banana stem probiotics, the T2 container will be filled with unfermented banana stem probiotics, the T3 container will be filled with biotic-extra brand market probiotics, and the C1 container will be without probiotics.

Testing the water quality before the transportation process as stated in the following table:

Table 1. Table of Water Quality before the Transportation Process

Repetition	Type Probiotics	Parameter			
		pH	Temperature	Do	NH3 (ammonia)
I	T1	7	32,4°C	8	0,0 (yellow colour)
	T2	7	32,4°C	8	0,0 (yellow colour)
	T3	7	32,4°C	8	0,0 (yellow colour)
	C1	7	32,4°C	8	0,0 (yellow colour)
II	T1	7	32,4°C	8	0,0 (yellow colour)
	T2	7	32,4°C	8	0,0 (yellow colour)
	T3	7	32,4°C	8	0,0 (yellow colour)
	C2	7	32,4°C	8	0,0 (yellow colour)
III	T1	7	32,4°C	8	0,0 (yellow colour)
	T2	7	32,4°C	8	0,0 (yellow colour)
	T3	7	32,4°C	8	0,0 (yellow colour)
	C3	7	32,4°C	8	0,0 (yellow colour)

From the table for temperature, pH and Do it is ideal for catfish seeds during the transportation process, and there is no ammonia in the water marked with a yellow color, meaning it does not contain NH3.

The following is the behavior of catfish seeds during the transportation process as stated in the following table:

Table 2. The Behavior of Catfish Seeds during the Transportation Process

Treatment	Behavior or activity of catfish seeds		
	2 hours	**4 hours**	**6 hours**
T1	Fish are still energetic and fast swimming, sensitive to external responses	Some of the fish are already calm at the bottom, swimming slowly.	There was death in the catfish, some showed stress, and fainted but if you touch it, it moves slowly and is not very sensitive to response, the water is a little cloudy.
T2	Fish are still energetic and fast swimming, sensitive to external responses	Some of the fish have calmed down on the bottom, some are still swimming fast.	Fish have shown stress, slow movement, and irregular gill movements and finally some of them died.
T3	Fish are still energetic and fast, sensitive to external responses	Some of the fish are already calm at the bottom, swimming slowly.	There was death in the catfish, some showed stress, and fainted but if you touch it, it moves slowly and is not very sensitive to response, the water is a little cloudy.
C1	Fish calm on the bottom, occasionally swimming slowly	Fish stay at the bottom, some have tilted bodies, don't respond too much when disturbed. The fish are already stressed, secrete mucus, some have died	Experiencing a spike in mortality, dead fish turn pale in color, fish that have been dead for a long time float, fish that are still alive are stressed, faint, move slowly. The color of the water started to turn cloudy

When the 6-hour journey ends, the catfish seeds are checked again for the quality of the water after transportation. As the results of water quality after the transportation process are listed in the following table:

Table 3. Table of Water Quality after the Transportation Process

Repetition	Probiotic Type	Parameter			
		pH	Temperature	Do	NH3 (ammonia)
I	T1	7,8	32,6°C	6,6	0,10 (yellow)
	T2	7,39	32,7°C	6,2	0,25 (Greenish yellow)
	T3	7,9	32,2°C	5,9	0,25 (Greenish yellow)
	C1	8,2	33,8°C	4	1,00 (Light green)
II	T1	7,7	32,7°C	6,5	0,10 (yellow)
	T2	7,4	32,5°C	6,1	0,25 (Greenish yellow)
	T3	7,5	33,4°C	5,9	1,25 (yellow)
	C2	7,43	34,2°C	4	1,00 (Light green)
III	T1	7,66	32,7°C	6,3	0,10 (yellow)
	T2	7,4	32,5°C	6,2	0,25 (Greenish yellow)
	T3	7.57	33,4°C	5,9	1,25 (yellow)
	C3	7,43	34,2°C	4	1,00 (Light green)

The content of dissolved oxygen (DO) in all treatments before the transport process was 8 mg/L. However, after the transportation process based on the data above, the Do in each treatment decreased due to the activity and metabolism of fish during the transport process which removes metabolism such as carbon dioxide and ammonia, however, the Do in treatments T1, T2, T3 was still normal, which ranged from 5-6 mg/L. This is in accordance with statement of Siregar et al. (2017), that "DO that can still be tolerated by catfish is 5-8 mg/L". However, for treatment 4 without probiotics, it can be seen from the DO table that it was not ideal, namely showing 4 because there were too many dead catfish seeds, high carbon dioxide so the DO decreased. If DO goes down, fish are stressed, easily attacked by microbes that cause disease and can even experience death.

The temperature of the catfish is in the range of 24 ºC – 32 ºC. Temperature conditions before transport were around 32 ºC and normal for catfish seeds. Low temperature will cause low metabolic activity and reduced oxygen use, so that it can reduce the death rate. However, in the C1 and C2 treatments without the provision of probiotics, the temperature increased

from normal conditions, namely around 33 ºC and 34 ºC, this was no longer ideal due to the accumulation of carbon dioxide and the large number of catfish seeds that had died due to the long transportation process.

The pH value in the transport process is between 7-8 . The range of pH values is still in the ideal range for the survival rate of catfish fry in the transportation process in accordance with statement of Emu (2014) that "a good pH for the transportation process is in the range of 7-8". However, in the study there was an increase in the pH of the water from 7 to 8 due to an increase in the concentration of OH- in the water.

Van Wayk et al. (1999) in Afriansyah et al. (2016) states that "fish metabolism is in the form of protein and there are nitrogen elements (amine groups)". The release of amine groups in water will produce nitrogen compounds (NO2) and ammonia which will increase the concentration of NH3 in the transport medium. NH3 conditions in the study ranged from 0.10-1.00 ppm NH3 was still in the ideal range, which ranged from 0.00-0.058 ppm. So for treatments T1, T2, and T3 the ammonia was still normal but in the treatment C the ammonia was high, namely 1.00 ppm. NH3 is a form of ammonia which is toxic, ammonia increases if there is an increase in pH and temperature in the transport medium and a decrease in dissolved oxygen (DO) levels. Sayekti et al. (2015) stated that "high concentrations of NH3 in the water also increase the use of oxygen by the tissues, damage the gills and reduce the blood's ability to bind oxygen so that catfish fry become exhausted, stressed and die during the transportation process".

Based on research given fermented banana stem probiotics (T1), unfermented banana stem probiotics (T2), and commercial probiotics are in accordance with water quality during the transportation process and this is in accordance with the opinion of Fuller, (1987 in Febriani and Rietje, 2008) that probiotics in the transportation process play a role in regulating microbiological conditions in water in order to improve water quality in the transportation process so as to increase the survival of catfish fry. While the conditions without probiotic administration have poor water quality and lead to a low survival rate of catfish fry during the transportation process.

The survival rate (SR) is the percentage of live fish at the end of the transportation process compared to the number of fish before the transportation process. The survival rate is formulated as follows:

$$SR = Nt / N0 \text{ X } 100 \%$$

Information:
SR = Survival (%)
Nt = Number of live fish at the end of the transportation process.
N0 = number of fish before the transportation process. (Hartanto et al., 2015)

Table 4. survival rate (SR)

Treatment (type probiotics)	Survival rate (SR)		
	Repetition I	Repetition II	Repetition III
T1	90%	86 %	84 %
T2	98 %	98%	96 %
T3	88%	90%	84 %
C1	20%	28%	20%

In the table above, the highest survival rate which is calculated using the formula SR = Nt/No x 100% is in the T2 treatment, namely the provision of unfermented banana stem probiotics with values of 98%, 98%, and 96% followed by treatment T3 is probiotics marketed with values of 90%, 88%, and 84% and continued with T1, namely fermented banana stem probiotics with values of 90%, 86% and 84%. Whereas for the C1 treatment or without probiotic administration had the lowest survival rate with values of 20%, 28% and 20%. This really proves that probiotics have an influence on the survival of catfish seeds and it is very necessary to be added during the process of transporting catfish seeds.

Based on the SPSS calculation of the normality test using the Kolmogorov Smirnov test, the survival data for catfish fry in this study were normally distributed, because the significant value was 0.200 > 0.05. The homogeneity test is a requirement in the independent analysis of the ANOVA test because the significant value in the data is 0.347 > 0.05, so the data distribution is homogeneous. The data has been normally distributed and the diversity is homogeneous so that the data meets the requirements to be analyzed by a one-way ANOVA test to determine the effect of the treatment. The results of the analysis of variance obtained significantly smaller values at the test level of 0.05, namely 0.00 <0.05. This shows that there is a difference between each treatment. Then to find out the differences between the treatments of giving probiotics on the survival of catfish seeds, the Duncan test was carried out. From the results of Duncan's test, it can be seen that treatment T1, namely fermented banana stem probiotics and market probiotics T3, was not significantly different, while treatment C1, namely without administration of probiotics, was very significantly different from T2, namely administration of banana stem probiotics without fermentation or T1 or T3, while treatment T1 with T2 and T3 are significantly different.

4. CONCLUSION

Probiotics from processed banana stems have an effect based on the ANOVA test of variance with a significantly smaller value at the test level of 0.05, namely 0.00 <0.05. This shows that there are differences in each treatment of giving probiotics in the transportation process and has a significant effect on the survival rate of catfish seeds. From the results of the Duncan test T1, namely fermented banana stem probiotics and market probiotics T3, were not significantly different, while the C1 treatment, namely without probiotic administration, was very significantly different from T2 (granting unfermented banana stem probiotics) or T1 or T3, while the T1 treatment with T2 and T3 is significantly different. Probiotics from processed banana stems increase the survival of catfish seeds because they contain chemical compounds such as saponins, flavonoids, alkaloids and tannins which have an effect on the quality of the water which is still proper after the transportation process, the condition of fish behavior that is still energetic, not stressed and not attacked by bacteria and pathogenic parasites, both during the transportation process and after the transportation process. The best treatment that resulted in the highest survival rate with SR = 98%, 98%, and 96% was by giving unfermented banana stem probiotics (T2), followed by SR = 90%, 88%, and 84% with probiotics market (T3) and SR = 90%, 86% and 84% with fermented banana stem probiotics (T1) and without probiotics (C) had very low survival rates, namely SR = 20%, 24% and 24%. Based on these effects, banana stem probiotics have an influence to support increasing the survival of catfish seeds in the transportation process.

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