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UTILIZATION OF PROBIOTIC MICROBES IN FISH FARMING

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Abstract:

Probiotic microbes are widely used for fish farming activities. This review article aims to explain the use of probiotics in fish farming activities. Based on the results of the study, information was obtained that the sixprobiotic microbial changes have an influence on fish farming activities, including to improve water quality, prevent bacteria, and increase the daily growth rate of fish. Added probiotics are good for improving water quality, bacteria prevention, and increasing the daily growth rate of fish there at a certain concentration limit.

Keywords: Water quality, fish growth, disease, bacterial infection, conservatium.

Introduction

Probiotics are microbes that stimulate the growth of other microbes. Other definitions of probiotics include 1) are microbes that live in the host's body with adequate amounts that will provide health benefits to the host, 2) are food ingredients in the form of living microbes that can provide benefits for health (functional food components), and 3) are live microorganisms that are consumed in sufficient quantities so that they are beneficial to the health of the host (be it animals or humans)

The working principle of probiotics is to utilize the organism's ability to decompose long chains of carbohydrates, proteins and fats. This ability is obtained due to the presence of special enzymes possessed by microorganisms to break down bonds. The breakdown of complex molecules into simple molecules facilitates absorption by the human/animal digestive tract. On the other hand, these breaking microorganisms benefit in the form of energy obtained from the results of an overhaul of complex molecules.

Effective probiotics must meet several criteria. There are seven criteria that must be met, namely 1) Providing a beneficial effect on the host, 2) Non-pathogenic and non-toxic, 3) Containing a large number of living cells, 4) Being able to survive and carry out metabolic activities in the intestines, 5) Staying alive during storage and time used, 6) Having good sensory properties and 7) being isolated from the host.

Probiotics can be used in various fields including fisheries activities. This review article aims to explain the use of probiotics in fish farming activities

Utilization of Probiotics in Aquaculture Water Quality

According to Gunarto et al. (2016) probiotics play a role in improving water quality, total organic matter, ammonia and phosphates. In addition, the addition of probiotics to shrimp rearing containers also functions as a complement to feed sources or contributes to the shrimp digestive system and can suppress pathogenic bacteria because probiotic bacteria are able to produce anti-bacterial ingredients such as bacteriocins, lysozyme, proteases, siderophores, hydrogen peroxide or organic acids.

Various studies have been conducted in Indonesia related to the use of probiotics to maintain water quality in fish or shrimp farming activities. Atmomarsono et al (2009) have informed about their research related to the use of probiotic bacteria with different compositions to improve water quality and post-larval survival of tiger shrimp. The results of the study showed that the use of probiotic bacteria from ponds and mangroves can significantly control the content of organic matter ($P<0.05$). Probiotic bacteria from the sea and mangroves singly and their combinations can suppress the increase in ammonia in the water of the tiger shrimp postlarva maintenance media ($P<0.05$). Probiotic bacteria are not able to suppress the increase in nitrites content in shrimp rearing media water ($P>0.05$), but the concentration is still safe. Probiotic bacteria of marine origin can suppress postlarva mortality of tiger shrimp through the control of the breeding of Vibrio spp bacteria. in water.

Other research was also reported by Purba et al (2021) which is related to the effect of Probiotic Administration on Maintenance Media on Water Quality and Growth of Baung Fish Fry (*Mystus Nemurus*). The research results obtained are related to water quality as shown in Table 1.

Table 1. Water quality data of baung fish fry maintenance media during the study

Treatment	Dissolved oxygen (mg/L)	Ph	Temperature (^oC)	Ammonia (mg/L)
Tampa Probiootic Administration (P1)	4.8	7.06	28.6	1.12
Addition of probiotic EM4, 0.5 ml/L (P2)	4.7	7.42	29.4	1.10
Addition of probiotic EM4, 1.0 ml/L (P3)	4.9	7.69	29.2	0.75
Addition of probiotic EM4, 1.5 ml/L (P4)	4.6	6.80	28.9	0.85

Source : Purba et al (2021).

Based on Table 1 above, probiotic administration can reduce ammonia levels in water bodies in the maintenance of baung fish fry. Ammonia levels are an important parameter because they have an impact on fish death. According to Khasani (2007) the provision of probiotics in maintenance media is expected to improve water quality by decomposing the remnants of fish feed and feces.

Utilization of Probiotics in the Prevention of Bacterial Infections in Fish

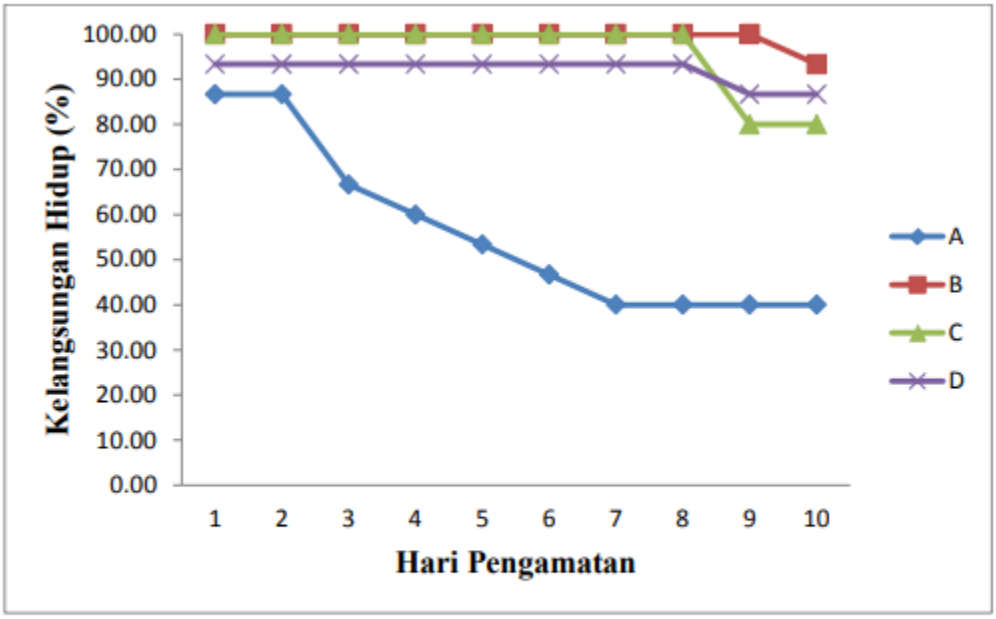
One of the causes of fish death in aquaculture activities is bacterial attacks on fish or bacterial diseases. If the fish remains alive during a bacterial attack then the appearance of the flesh is ulcers or wounds so that the appearance becomes unattractive.

According to Yanuar and Manoppo (2017), disease attacks are one of the factors that affect the amount of production from fish farming businesses, which can result in the amount of fish production decreasing drastically due to disruption of growth or the occurrence of mass deaths.

One of the efforts to control the attack of these bacteria can be used probiotic bacteria. The use of probiotics as a solution to abandon the use of chemicals and antibiotics. According to Mansur and Tangko (2008) the use of probiotics in the field of cultivation can maintain microbial balance and control potegen in the digestive tract (Mansur and Tangko, 2008). Several types of beneficial bacteria have been and are temporarily developed as probiotics including types of lactic acid bacteria (BAL) such as Lactobacillus, Pseudomonas, Bifidobacterium, Streptococcus, Enterococcus, and Bacillus (Ijong and Ohta, 1996).

The use of probiotic bacteria in the control of bacterial attacks is usually mixed into the feed given. Research that has been carried out in Indonesia is related to the use of probiotics for the control of bacterial infectious diseases in fish, as reported by Umasugi et al (2018). His research

was titled "The use of probiotic bacteria to prevent Streptococcus agalactiae infection on Nile tilapia, Oreochromis niloticus". The results of his research showed that the addition of commercial probiotic bacteria to the feed for 21 days had a noticeable influence on the survival of tilapia *Oreochromis niloticus* against S. agalactiae bacterial infection. Data related to the survival of tilapia fed with varying degrees of probiotic addition and tested with *the bacterium Sterptococcus agalactiae* as shown in Figure 1.



Gambar 1. Kelangsungan hidup kumulatif ikan nila (*Oreochromis niloticus* setelah diuji tantang dengan bakteri *S. agalactiae* ($1x10^7$ cfu/mL)

Ket.: A: 0 mL/Kg pakan, B: 10 mL/Kg pakan, C: 15 mL/Kg pakan, D: 20 mL/Kg pakan

Source : Umasufi, et al. 2018.

Other information about the use of probiotics to ward off bacterial infections in fish was reported by Ariyanto (2017). His research was entitled " Optimization of Different *Ursal* Probiotic Administration to Non-Specific Immune Responses of Goldfish *(Chyprinus Carpio*) Tested to Challenge *Aeromonas Hydropilla Bacteria.* The results showed that the addition of probitics to the feed affected the survival of the mas (Cyprinus carpio) which was tested to challenge the aeromonas hydropila bacteria with a density of 10^6 degrees Cfu / ml. The survival of goldfish in various treatments of probiotic addition in feed is table 2.

Table 2. The survival of goldfish in various probiotic addition treatments

Treatment	Deuteronomy			Average (%)
	1	2	3	
Feed Without The Addition of Ursal Probiotics (Control) (A)	40	20	20	26.7[a]
Feed and Ursal Probiotics with a Concentration of 0.1 % (B)	60	60	60	60[b]
Feed and Ursal Probiotics with a Concentration of 0.2 % (C)	80	80	70	76.7[b]
Feed and Ursal Probiotics with a Concentration of 0.3 % (D)	20	40	40	33.4[b]

Source : Ariyanto (2017).

Based on Table 2 above, it shows that the addition of probiotics with a concentration of 0.2% resulted in the highest survival rate compared to other treatments (0%, 0.1% and 0.3%). An increase in the concentration of probiotics added in the feed is not always followed by an increase in fish survival.

Utilization of Probiotics in Fish Growth

The addition of probiotics to fish feed can increase feed efficiency so that the feed is easier to digest and enzymes can work more effectively (Putra, 2010). Quality feed in addition to acting as the main energy source is also expected to be able to increase the digestibility of fish so that growth becomes optimal.

Probiotic bacteria also produce enzymes that are able to break down complex compounds into simple so that they are ready for fish to use. The bacteria contained in probiotics have a mechanism in producing several enzymes for feed digestion such as amylase, protease, lipase and cellulase, so as to increase the nutritional value of feed (Sakamole et al., 2014).

The application of probiotics in the aquaculture system plays an important role in determining the success rate of cultivation. Probiotics consumed by fish in sufficient quantities are beneficial for fish health. Probiotics in the field of aquaculture have antimicrobial effects for the

control of pathogens in the gastrointestinal tract. Competing microorganisms in the gastrointestinal tract prevent pathogens from taking the necessary nutrients of fish (Cruz et al., 2012).

Various studies on the use of probiotics in supporting the growth performance of fish during the maintenance or cultivation process have been widely carried out. Chimawati et al (2018) have reported the results of their research on the use of probiotics to increase the growth of whitefish *(Chanos-chanos*). The results showed that the addition of probiotics to milkfish feed had a significant effect on the relative growth rate of whitefish. The growth rate of milkfish fed with probiotics was 1,958±0.02 %/day while those not given additional probiotics were 1,573±0.02%/day.

Probiotics can be isolated from the gastrointestinal tract of organisms, one of which is goldfish (Cyprinus carpio). According to Bella (2018) the results of bacterial isolation in the digestion of goldfish get rod-shaped bacteria, round and convex colonies and produce milky white pigments. Through the Gram Test (Gram Staining) the bacteria are included in the Gram Positive, and based on biochemical tests the bacteria is Lactobacillus sp. where, the bacterium is one of the bacteria commonly used as probiotics.

Mudeng et al (2020) reported the results of their research using probiotic microbes derived from the digestive tract of fish to increase the growth of these fish. The title of his research was "Supplementation of probiotic bacteria improves the growth performance and efficiency of carp fry feed (Cyprinus carpio)". The results of the study inform that the addition of probiotics isolated from the intestines of goldfish into the feed can increase the daily growth rate. Giving probiotics with a concentration of 1 X 10^8 cfu / mL produces the highest daily growth rate compared to without probiotics, probiotic administration 1 x 10^6 cfu / mL, 1 x 10^7 cfu / mL or 1 x 10^9 cfu / mL

Conclusion

The addition of probiotic microbes has an influence on fish farming activities, including improving water quality, preventing bacteria, and increasing the daily growth rate of fish. Added probiotics are good for improving water quality, bacteria prevention, and increasing the daily growth rate of fish there at a certain concentration limit.

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