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PROBIOTICS AS A BIOTECHNOLOGICAL APPROACH IN FISH DISEASES PREVENTION

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ABSTRACT

The application of biotechnology in fisheries is very broad, starting from the engineering of cultivation media, fish, to post-harvest fishery products. Microorganisms play an important role in the development of biotechnology. The role of microorganisms in fisheries is very important. Some diseases that attack fish are caused by microorganisms. The beneficial role of microbes will help with metabolism as well as feed ingredients or additional feed and probiotics. Probiotics which are used as biological control agents for fish diseases have been widely used in aquaculture. The target disease agent is usually bacteria, and challenge testing by means of infection with a wide variety of pathogens has been treated in several commonly farmed fish species. Some effective probiotics, especially those given before challenge tests against infectious agents, can increase "colonization resistance" compared to controls. Therefore a technical innovation is needed to overcome problems in fish disease prevention, one of which is probiotics as a biotechnological approach that has been widely applied to improve fish health.

KeyWords
Biotechnology, Microbes, Fish Disease, Probiotics

INTRODUCTION

Biotechnology is the application of biosciences and technology which concerns the practical application of living organisms or their sub-cellular components in the service and manufacturing industries as well as environmental management. Biotechnology makes use of: bacteria, yeast, fungi, algae, cultivated plant or animal cells as elements of various industrial processes.

The application of biotechnology in fisheries is very broad, starting from the engineering of cultivation media, fish, to post-harvest fishery products. The use of microbes has been proven to be able to maintain the quality of the culture medium so that it is safe to use as a medium for fish cultivation. Biotechnology has created fish with distinctive genetic characteristics that are produced through gene engineering. Through gene engineering, we can create fish that grow fast, have attractive colors, have thick flesh, are disease resistant and so on. Therefore, the applications of biotechnology are very important to study, especially in the field of fisheries.

Development in fisheries needs to be done to meet the needs of the global community. However, fish aquacultureand capture fisheries still have problems such as disease, expensive feed prices, the amount of production that does not meet and various other problems. Biotechnology can be a promising tool for overcoming problems in fisheries [1]. Therefore a technical innovation is needed to overcome problems in fish disease prevention, one of which is probiotics as a biotechnological approach that has been widely applied to improve fish health.

BIOTECHNOLOGY

According to Bull et al. (1981), biotechnology is the application of the principles of science (natural science) and engineering (technology) for the processing of a material by involving the activities of living bodies to produce goods and / or services. Biotechnology is the application of scientific and engineering principles to the handling and processing of materials with the help of biological agents to produce materials and services. Biotechnology is a technique of utilizing living organisms or parts of organisms to make or modify a product and improve / improve the properties of plants or animals or develop microorganisms for special uses (Primrose 1982).

Biotechnology comes from two words, namely 'bio' which means living things and 'technology' which means a way to produce goods or services. From the combination of these two words, the European Federation of Biotechnology defines biotechnology as a combination of natural science and engineering science which aims to increase the application of living organisms, cells, parts of living organisms, and / or molecular analogues to produce products and services.

Based on the above definitions and definitions, biotechnology is nothing but a process whose elements are as follows:

1. Input, the raw material to be processed such as; rice, wine, milk etc.
2. Process, the processing mechanism which includes; the process of decomposition or preparation by biological agents.

3. Output, the products in the form of goods and / or services, such as; alcohol, enzymes, antibiotics, hormones, waste treatment.

Whatever limitations are put by certain experts in the biotechnological process, there are three main points:
1. Biological agents (microbes, enzymes, plant cells, animal cells)
2. Utilization technologically and industrially
3. Products and services obtained.

MICROBIOLOGY AS BIOTECHNOLOGY AGENT

Microorganisms play an important role in the development of biotechnology. Rapid growth and multiplication of microbes Easily obtained from the environment Genetic traits are easily modified through genetic engineering Has plasmids used as vectors Does not depend on climate and environmental conditions Has a fixed and unchanging character.

The basic principles of biotechnology are the existence of biological agents (microbes, enzymes, cells), the utilization of technology to manipulate DNA, the products and services obtained and the use of various disciplines related to the product. Scientists provide limitations related to biotechnology, namely relating to biological catalysts (enzymes) for certain functions or processes, creation by utilizing catalysts, and sifting or refining of essential products for the products produced.

The scope of fisheries biotechnology is classified into two :
1). The biotechnological process itself includes bioreactors, fermentation, and bioprocesses. Examples include cultivation / cell factories in macro and micro algae, diatoms and cyanobacter organisms with open ponds / tanks (raceway ponds, shallow ponds, and circular ponds) systems, reactors (photobioreactors and fermenters) to produce carotenoids, polysaccharides, and omega 3 fatty acids.
2). Molecular biology, which includes DNA extraction and isolation, metagenome, cloned in host, sequence based screening that produces gene identification and functional based screening that produces enzymes or other metabolite products.

The role of microorganisms in fisheries is very important. Some diseases that attack fish are caused by microorganisms. The beneficial role of microbes will help with metabolism as well as feed ingredients or additional feed and probiotics. In terms of metabolism, microbes help livestock and fish hydrolyze cellulose because of the enzymes they contain. In addition, bacteria are able to fix urea as a nitrogen source.

MICROORGANISM APPLICATIONS IN FISHERIES BIOTECHNOLOGY: PROBIOTICS

The term "probiotic" comes from the Greek words "pro" and "bios" meaning "for life"; generally refers to microbes added to the host to feed the host organism through modulation of the gut microbiota [Hoseinifar 2018]. Parker in 1974 was the first to define probiotics as organisms and substances that affect microbes in the gut. According to the World Food and Agriculture Organization (FAO) and the World Health Organization (WHO), probiotics are live microorganisms that are taken orally that have several obvious health benefits for the host (Hotel and Córdoba, 2001). Probiotics according to Fuller (1992), are live microbes added to feed that

can provide beneficial effects for host animals by improving the balance of their gut microbes. In fisheries, where there are differences between the environment in aquatic ecosystems and terrestrial animals, the modified definition for probiotics in aquaculture is as, "probiotic organisms can be considered as living, dead or components of microbial cells, which are given through feed or rearing water, beneficial. the host by increasing disease resistance, health status, growth performance, feed utilization, stress response or general strength, which is achieved at least in part through improving the microbial balance of the host or the microbial balance of the surrounding environment" (Merrifield et al. 2010). Bacteria, bacteriophages, microalgae and yeast which have been widely used in aquaculture through water or feed supplements (Llewellyn et al., 2014).

Probiotics which are used as biological control agents for fish diseases have been widely used in aquaculture. The target disease agent is usually bacteria, and challenge testing by means of infection with a wide variety of pathogens has been treated in several commonly farmed fish species. [Llewellyn et al., 2014]. More than 30 different genera of bacteria have been administered as probiotics (Newaj-Fyzul et al., 2013). Rhodococcus qingshengii has been successfully applied to the treatment of Salevinus fontinalis infected with Flavobacterium psychrophilum (Boutin et al., 2012). Some effective probiotics, especially those given before challenge tests against infectious agents, can increase "colonization resistance" compared to controls (De la Banda et al., 2012). Longitudinal observations of the original microbiome during these trials have been rare, and there is clearly significant scope for further research [Llewellyn et al., 2014].

Various probiotic products for fisheries applications have been widely marketed with a variety of uses, but basically the probiotic working model can be grouped into 3, namely:
Suppress the microbial population through competition with the production of antimicrobial compounds or through competition for nutrients and attachment sites on the intestinal wall.
Altering microbial metabolism by increasing or decreasing the activity of decomposing enzymes (cellulases, proteases, amylases and others).

Stimulates immunity through increased levels of aquatic organisms antibody or macrophage activity. Probiotics as decomposing agents are a group of beneficial microorganisms or microbes, such as: Bacillus spp. In its application in the world of fisheries, probiotics as a decomposing agent can be used either directly by spreading it into water or through live food intermediaries.

According to Fuller (1989) and Farzanfar (2006) a biological agent is called a good probiotic when:

- Favorable host
- Able to live even though it does not live in the intestines of the host
- Must be able to live and metabolize in a fresh environment, resistant to low temperatures and organic acids
- Can be prepared as a live cell product on a large scale (industrial)
- Can maintain stability and synthesis for a long time both in storage and in the field
- It is not pathogenic and does not produce toxic compounds

Efforts are made to control infections caused by bacteria that cause disease, one of which is to prevent by increasing the fish body's defense system, including by utilizing probiotics.

CONCLUSION

Biotechnology in the prevention of disease in fish is carried out by providing probiotics to fish and bioremediation in an effort to control environmental damage by polluted materials. Probiotics as decomposing agents are a group of beneficial microorganisms or microbes, such as: Bacillus spp. In its application in the world of fisheries, probiotics as a decomposing agent can be used either directly by spreading it into water or through live food intermediaries.

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