

# The Application Of Probiotics And Medical Plants As Immunostimulants To Aquaculture In Samatiga Distric, West Aceh Regency

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## Abstract.

*The purpose of this community service was to educate the application of probiotics and immunostimulants in aquaculture. This activity was carried out in Cot Darat village, Samatiga District, West Aceh Regency. This activity is divided into three steps, namely: (1) Introduction and socialization of probiotics and immunostimulant; (2) practice to produce probiotics and the application techniques; and (3) the monitoring of fish health and growth during cultivation. The type of bacteria used in this probiotic is Lactobacillus bacteria and the immunostimulant ingredients are turmeric and curcumin. Lactobacillus, turmeric and curcuma are known can improve fish health in aquaculture. The results of this activity indicate that group members have understood the definition of probiotics and immunostimulants, their benefits and how to make and apply them in aquaculture. In addition, fish health and growth are increase during fish culture compare before the probiotics was applied. The differences that occurred during probiotics application in fish cultivation were seen that the fish became healthier, the growth was better, and fish mortality decreased.*

**Keywords:** Lactobacillus, turmeric, curcumin, fish health, fish growth.

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## I. INTRODUCTION

Samatiga is a district located in Aceh Barat Regency has potency in aquaculture sector, but unfortunately the total production has not optimal. It was caused by the lack of fish farmer's ability to apply technology, including biotechnology. The ignorance of fish farmer about renewable technology make their production in aquaculture business are not optimal or sustain. This situation happened on a fish farmer group in Cot Darat Village, Samatiga District. The obstacles experienced by its fish farmer group such as slow growing fish, high fish mortality rate, fish loss appetite and fish diseases. Food and Agriculture Organization (FAO) recommends the application of probiotics in aquaculture activities as a solution of its problem because probiotics contain a variety of non-pathogenic live microorganisms that provide good and beneficial effects for host organism [1]. There are some benefits of probiotics in aquaculture namely to improve feed utilization, as growth promotor, enhancement of the immune response, improve the stress tolerance and improve water quality [2].

In addition to probiotics, medical plants have been used in aquaculture as immunostimulants such as mistletoe, nettle, ginger [3], curcumin [4], white turmeric [5], and others. The most benefit of immunostimulant application in aquaculture is to provide the function of phagocytic cells and increase their bactericidal and fungicidal activities [6]. Therefore, the application of immunostimulants have been one of the most promising methods for preventing disease through strengthening fish immune system. Based on the benefits of probiotics and immunostimulants combination in aquaculture, it can apply to resolve fish health problems that are often faced by fish farmers in Samatiga district. In addition, its ingredients are selected from surrounding environment which easily available, also affordable prices. The success of biotechnology application based on probiotics and immunostimulants as a community service was expected to increase aquaculture production through improving fish health and growth.

## II. METHODS

The activity of community service through the application of probiotics and immunostimulants have been implemented in Cot Darat village, Samatiga district West Aceh regency. Its activities have been divided into three steps, namely (1) Introduction and socialization of probiotics and immunostimulant; (2) practice to produce probiotics and the application techniques; and (3) the monitoring of fish health and growth during cultivation. The participatory approach methods used are through training, direct participation, mentoring and coaching.

## III. RESULT AND DISCUSSION

### 3.1 Introduction and Socialization of Probiotics and Immunostimulant

As introduction stage, we started socialization about the definition, benefits, and ingredients of probiotics and immunostimulants for aquaculture purpose. This activity located at the leader of fish farmer group house which was attended by all members. There are eight people of group members enthusiastically participated in this activity. At the beginning of the socialization, discussion session was conducted to obtain the preliminary information of their knowledge about probiotics as a technology in aquaculture. The results showed that all group members have not known about probiotics and its application in aquaculture.



**Fig 1.** (a). Presenter socialized about probiotics and immunostimulants;  
(b). Participants enthusiasm.

At the end of the socialization, we continued discussion to determine the participants' understanding of learning materials that had been presented. Discussion results showed that participants have been understand the definition of probiotics, the benefits and ingredients used to produce probiotics and immunostimulants. Furthermore, discussions were held to prepare the next step of its community service activity. The skills improvement through capacity building training in processing natural resources is one of community development program [7]. Community development is an activity together with the community by increasing the active participation to resolve community problems [8].

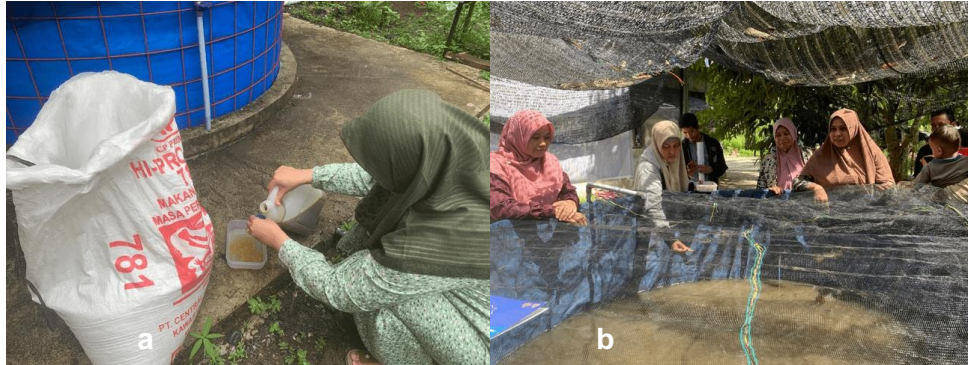
### 3.2 Practice to Produce Probiotics and the Application Techniques

The ingredients used to make probiotics are brown sugar, turmeric, curcumin, yeast, coconut water from a ripe coconut, yakult (as bacteria resources) and water. The mixture of ingredients was mixed evenly and then put into the container but not full (leaving a small space in the container). The purpose of small space was for the accumulation of gasses produced by fermentation process. Furthermore, probiotic was stored into unexposed light room to maximize the fermentation process. Its process takes approximately seven days. During this fermentation process, the container cap should be opened for 1 to 2 minutes per day to release the gas produced.



**Fig 2.** Probiotic manufacturing process

The success of probiotics was indicated by the presence of a fermented odor when the cap is opened. After the probiotic have been fermented, it can be directly applied by mixing 1 to 2 container cans into 1 liter of water and then spraying them to fish feeds. Then, let it left for 5 minutes before given to fishes. The application of this probiotic is carried out every day until the fish harvested. The utilization of *Lactobacillus* bacteria in probiotic because its bacteria have the ability to affect and improve fish immune system [9]. Yeast can help fermentation process in the manufacture of probiotics to produce lactic acid, so the pH level decreased. This environment condition is suitable for bacterial growth [10]. Nutrient content in coconut water has good potential for fermenting organic acids [11].



**Fig 3.** (a) The application of probiotics to fish feeds (b) feed the fishes with mixture fish feeds and probiotic

### 3.3 The Monitoring of Fish Health and Growth During Cultivation

The monitoring of fish health and growth was carried out during fish culture with probiotics and immunostimulants. In addition, fish samples were also taken every two weeks for weight measurement and fish health monitoring. During the cultivation period, total number of fish mortality was about 4% from total fish stocked. The mortality occurred at the beginning of the culture period, around the first week. It was estimated by fish fingerlings adaptation to their new environment and the recovery period after the transportation process.



**Fig 4.** Fish health and growth monitoring during fish cultivation.

According to reports, probiotics as feed additives application can present better growth and health for fish to supply the potential requirements [12]. Bacteria *Lactobacillus* used as probiotics, improved fish health, increased fish digestion process, disease resistance and feed conversion, decreased sensitivity to stress, and improved fish maintenance status [13]. The combination of probiotics and immunostimulants have beneficial effects in aquaculture, such as leading to increased disease resistance and nutrient availability, improved sustainability and profitability of fish production [14].

## IV. CONCLUSION

The utilization of probiotics and immunostimulants for fish in aquaculture can improve fish health and growth, but reduce fish mortality during cultivation. The mixing of *Lactobacillus* bacteria as good bacteria and turmeric and curcuma as immunostimulant ingredients in probiotics give good effect on fish health and growth in aquaculture.



## V. ACKNOWLEDGMENTS

The authors thank and appreciate Teuku Umar University for supporting this community services through the competitive grant schema research-based community services 2022.

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