Review on pathogenic bacteria potentially threaten aquaculture

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https://www.e3s-conferences.org/articles/e3sconf/abs/2020/62/e3sconf_icenis2020_06022/e3sconf_icenis2020_06022.html
Published online: 10 November 2020
https://doi.org/10.1051/e3sconf/202020206022

A review on pathogenic bacteria that potentially threaten the environment of aquaculture: controlling and aquaculture sustainability in Pontang, Serang

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Abstract. Pontang District located in Banten Bay has the potential for the development of shrimp farming. One of the challenges of shrimp farming is a disease caused by Vibrio bacterial. One way to control disease is to apply the principle of biosecurity to support sustainable aquaculture. In some cases, the Vibrio bacterial group is known to have caused serious illness in shrimp ponds. This paper reviews some of the literature on the concept of biosecurity in controlling disease for sustainable aquaculture that might be implemented in Pontang District. The role of local authorities is very important in the implementation of biosecurity. Disease control by farmers can be done by doing water management, good production processes and routine health monitoring.

Keywords : pathogenic bacteria, controlling, biosecurity

1 Introduction

Pontang district is located on the Banten bay which has great fishery potential and is very suitable as a center for brackish aquaculture. Natural conditions in terms of biotic, abiotic and infrastructure support to be developed as a shrimp pond area with traditional or intensive management [1, 2].

Vannamei are shrimp that are in high demand because of high market demand and are easily cultivated compared to other types of shrimp. The challenge in shrimp culture is the presence of diseases and one of them is caused by bacteria, especially Vibrio which causes Vibriosis disease [3]. Vibrio is a bacterium that is commonly found in estuarine waters and is an opportunistic bacterium which will be pathogenic if conditions are out of balance.
The presence of disease is a factor that can have a negative impact on the economic, social, conservation, environmental [4, 5]. Meanwhile, disease attacks on aquaculture are also a

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threat to sustainable fish farming [6]. Then the need for strategies to minimize disease attacks, so that negative impacts can be avoided.

Biosecurity is a concept that has long been introduced and is widely used in the field of human health and terrestrial animals. This concept began to be used in aquatic animals as a tool to control disease [6, 7, 8, 9]. This biosecurity concept can be adopted in ponds in Pontang District, Serang Regency for sustainable aquaculture. The purpose of this paper is to offer this concept by reviewing the existing literature

2 Existing condition

2.1 Pathogenic bacteria

Shrimp farming is inseparable from the threat of disease caused by pathogenic bacteria. The results of bacterial testing on shrimp with clinical signs and water media originating from Bengkalis Island (Sumatra) and Jepara (Java) are *Vibrio alginolyticus*, *Vibrio parahaemolyticus*, *Vibrio harveyi*, *Vibrio shilonii*, *and Vibrio vulnificus* [10]. Shrimp affected by vibriosis in Kendal District, the test results showed the presence of *Vibrio vulnificus*, *Vibrio mimicus*, *Vibrio damsella*, *Vibrio parahaemolyticus* and *Vibrio fluvialis*. Shrimp show clinical signs such as reddish carapax, tail experiencing necrosis, swimming legs and walking feet reddening, dark hepatopancreas, skin and abdomen experiencing melanosis [3]. Vibrio bacteria group which is a pathogenic bacterium that can cause disease in aquatic biota with clinical signs such as those infecting shrimp above [11].

Acute hepatopancreatic necrosis disease is a disease that threatens global shrimp culture today, this disease causes mass death in shrimp in the early stocking on ponds. Infected shrimp show clinical signs of pale hepatopancreas and anthropy, empty intestine, flabby skin, hepatopancreas are black and striped, and when pressed between two fingers they do not break easily. *Vibrio parahaemolitycus* which has the toxin Pir A and Pir B is suspected as this disease [12]. The last three years began to find other agents that cause the disease, namely from other types of Vibrio bacteria such as *Vibrio campbellii, Vibrio harveyi* and *Vibrio owensii* [13, 14, 15].

Vibrio bacteria are commonly found in esturain waters and the possibility of these bacteria is found in the Pontang pond, Serang. The presence of these bacteria may cause illness in shrimp or other aquatic biota. These diseases can be avoided by good environmental management. Disease arises due to interactions between environmental factors, shrimp and unbalanced disease agents [16]. Therefore, the need for serious treatment to avoid the emergence of disease and control its spread.

2.2 Implementation of biosecurity in Pontang, Serang

The parameters of biosecurity application in the District of Pontang, Serang Regency are presented in Table 1. These parameters are a modification of some of the literature and conditions expected in disease control [17, 18, 19]. The ponds in Pontang District are mostly traditional small-scale shrimp and milkfish ponds which are managed simply and only a few intensive shrimp ponds. The layout of ponds and waterways is irregular to allow the water used to come from other ponds. These conditions provide opportunities for disease entry from one farm to another causing disease spread [20].

The challenges that are commonly faced in implementing biosecurity in small-scale farmers are the difficulty of preventing the spread of disease due to limited biosecurity knowledge and difficulties in accessing health services, as well as limited knowledge and means of diagnosing disease [21]. The Department of Food Security and Fisheries of Serang Regency as a local authority is trying to overcome this, by providing assistance to farmers by conducting education by extension agents and periodic monitoring by local laboratories, but the application of biosecurity in the field is difficult for farmers to implement.

Tabel 1. Biosecurity parameters in disease control

Parameters	
Local Authority Policy - Accompaniment - Emergency response procedures - Health services	Production process - fry management (fry origin and initial actions in compartment) - Feed management - Waste measures
Water Management - Water sources and reservoirs - Pool preparation - Water discharged	Monitoring fish health

3 Expected conditions: based on literature

3.1 Local authorities

The role of The Department of Food Security and Fisheries of Serang Regency as a competent local authority is very important in implementing biosecurity through policy [9]. Local authorities can also provide technical assistance [22]. The assistance can be in the form of education and training for farmers [23]. Education about biosecurity and training in field applicative disease diagnoses. It is expected that with education and training, farmers can carry out disease control simply and have a control plan as outlined in written form. The control plan can be made simple or maybe only one sheet that contains only information about infectious diseases and how to detect and control them. Simple recording is also needed to support biosecurity. Technical assistance can also be done through health services near the location to carry out disease monitoring and provide rapid detection of disease diagnosis services. As well as an emergency response procedure if there is an incident of an infectious disease that contains quick actions that must be taken and the party contacted which hierarchically has a higher level of level [9].

3.2 Farm-level

Water management is the main key in disease control, water source is a critical point that needs to be controlled, in addition to the management of feed in intensive ponds [24]. The water used may come from public waters such as estuaries or the sea, water can also come from pond waterways. These waters can be contaminated with disease agents, the precaution that can be taken is to collect water in the reservoir and conduct proper disinfection treatments with the right duration of lodging [19]. Traditional ponds do not use waterwheels and do frequent water changes, so efforts are needed to reduce water changes to limit the potential entry of disease agents [25].

Post larvae used must come from clear and disease-free sources, SPF Post larvae are highly recommended. SPF post larvae, in addition to minimizing disease can also increase production [26, 27]. The post larvaes to be used do not have to be put directly into the pond, quarantine measures are needed to ensure that the seeds are not sick and have good performance. Feed management is important, proper feeding can reduce the risk of disease. In intensive ponds, feeding is related to water quality. The remaining food and metabolism that accumulates at the bottom of the pond can be a source of pollutants that reduce water quality [28] so that the emergence of disease is very high. Delaying feeding at the beginning of the stocking is recommended because it can reduce feed residue and metabolism that settles to the bottom of the pond [19]. Feed or composition of feed used must be free from disease so that it needs accuracy in the selection of feed. Waste during production activities that are known to be infected with a disease must be disinfected in an appropriate manner [27]. Farmers are expected to monitor fish health regularly visually or if possible use a quick detection tool and record it simply [17].

4 Conclusions

Biosecurity can be used as a concept in disease control to support sustainable aquaculture. The Department of Food Security and Fisheries of Serang Regency as the local authority is very important in making policies related to the implementation of biosecurity. Implementation by farmers can be done through water management, good production processes and routine health monitoring.

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