

INCREASING VANNAMEI SHRIMP PRODUCTIVITY IN ROUND PONDS WITH THE BIOFLOC SYSTEM (REVIEW)

Peningkatan Produktivitas Udang Vaname di Kolam Bundar Dengan Sistem Bioflok (Telaah Pustaka)

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ABSTRACT

Vannamei shrimp is one of the commodities with high economic value. The increasing market demand for vannamei shrimp presents a significant opportunity for Indonesia. The high demand for vannamei shrimp aquaculture production necessitates the implementation of efficient and environmentally friendly farming technologies. One such technology is the Biofloc system. The application of the biofloc system in round ponds can enhance the growth and survival rates of vannamei shrimp. This method employs a literature review approach, analyzing both national and international journals accessed through online platforms like Google Scholar. The literature review was conducted in September 2024. The benefits of applying biofloc technology in vannamei shrimp farming in round ponds include increased productivity and growth of the shrimp.

Keywords: Vannamei shrimp, Round pond, Biofloc, Literature review

ABSTRAK

Udang Vaname merupakan salah satu komoditas yang bernilai ekonomi tinggi. Permintaan pasar udang vaname yang cenderung tinggi menjadi peluang yang sangat baik untuk Indonesia. Tingginya nilai permintaan produksi budidaya udang vaname, tentunya perlu penerapan teknologi budidaya yang efisien dan ramah lingkungan. Salah satunya adalah dengan penerapan teknologi Bioflok. Penerapan sistem bioflok di kolam bundar dapat meningkatkan pertumbuhan dan kelangsungan hidup udang vaname. Metode ini menggunakan teknik studi penelaahan terhadap jurnal nasional maupun internasional yang diperoleh melalui media online seperti Google Scholar. Tinjauan literatur dilaksanakan pada bulan September 2024. Manfaat penerapan teknologi bioflok pada budidaya udang vaname di kolam bundar dapat meningkatkan produktivitas dan pertumbuhan udang.

Kata kunci: Udang Vaname, Kolam Bundar, Bioflok, Telaah Pustaka

INTRODUCTION

The productivity of vannamei shrimp (*Litopenaeus vannamei*) is one of the main focuses in increasing aquaculture production. Vannamei shrimp is one of the commodities with high economic value. *Litopenaeus vannamei* is one of the most important shrimp species cultivated worldwide (Wardani et al, 2023). The demand for vannamei shrimp supply both domestically and abroad is also still relatively high. Reporting from the statistics website page of the Ministry of Maritime Affairs and Fisheries (KKP), Indonesia's shrimp production for export is the highest of any other type of fish, reaching 220,889.26 tons in 2023. In addition, the target is to increase national vannamei shrimp production by 250% in 2024 (Saraswati et al, 2023). Fishery exports are predicted to continue to increase every year. The high demand for vannamei shrimp market is a very good opportunity for Indonesia. The high demand for vannamei shrimp cultivation production needs the application of efficient and environmentally friendly cultivation technology. Increasing the production of vannamei shrimp cultivation is always carried out by increasing the stocking density with limited land and water sources, resulting in a decrease in the quality of aquaculture water (Ariawan, 2004; Muhsin, 2020).

Round ponds with tarpaulin material are quite effective and efficient alternatives in shrimp farming activities and in land use. The round pond makes the water move in a circle so that the entire water tank pool moves around its center (Fatimah et al., 2022). One of the methods that is quite popular is the cultivation of vannamei shrimp in a round pond with a biofloc system.

The Biofloc system is a water management technique in aquaculture that is popular today. Biofloc or activated sludge (activated sludge) is adopted from the biological treatment process of wastewater by utilizing bacillus bacteria for the formation of flocs (Adipu, 2019). This system utilizes waste from cultivation activities directly in the pond by paying attention to oxygen levels in the water and the growth of microorganisms.

The application of the biofloc system in round ponds is expected to increase the growth and survival of vannamei shrimp. The basic principle of biofloc technology is waste retention and its conversion into floc bacteria (Nugrha, 2022). The use of microorganisms that multiply in this biofloc system as a source of nutrients for shrimp will be more available. This system contributes to increased feed efficiency. In addition, better control of water quality parameters will support shrimp health and result in higher productivity. This study aims to provide further information and understanding about the productivity potential of vannamei shrimp in a round pond with a biofloc system.

METHODS

The method used is an exploratory descriptive method. This method uses a study technique for reviewing national and international journals obtained through online media such as Google Scholar. Descriptive research is research that is intended to collect information about the status of an existing symptom, that is, the state of the symptom as it is at the time the research is carried out without intending to make generalized conclusions or generalizations (Fahrianur et al, 2023).

Tool and Material

The tools and materials used are a literature review. The keywords used to search for topics and collect data are related to barberry ponds, vannamei shrimp, biofloc and vannamei shrimp farming productivity. Literature review to be conducted in September 2024.

RESULT

The following is a review of the literature that has been explored regarding the use of round ponds in shrimp farming as follows:

Table 1. The Use of Round Ponds in Shrimp Farming

No.	Aspects	Explanation	Source
1	Construction	The construction of a round pond uses HDPE plastic with a size of 0.5 mm and has an inlet (inlet) and an outlet (outlet).	Fatimah <i>et al.</i> , 2022
2	Water Control	In terms of controlling and regulating oxygen levels in a round pool or the like, it is relatively easy because the pool water is always mixed so that the oxygen content is almost the same anywhere in the pool. The desired oxygen level inside the round pool is very easy to maintain.	Annisa <i>et al.</i> , 2021
3	Growth and Productivity of Shrimp	The study using a household-scale round pond equipped with microbubble aerator technology measuring 0.5 HP and stocking density of 700 fish / m ³ obtained increased growth, SR value of 90.1% with a maintenance period of DOC 75, the average growth weight of shrimp at harvest time was 9.8 grams with a total biomass of 273 kg.	Nasuki <i>et al.</i> , 2022
		The productivity of vannamei shrimp in the round pond is very good, this is shown by a good yield of 30.3 grams/DOC (day of culture), FCR 0.82 and SR 92.60%.	Fatimah <i>et al.</i> , 2022
		Intensive cultivation of vananme shrimp with the construction of round ponds was able to give quite good yields, namely the total harvest at DOC 84 produced ABW 13.68 gr, SR 73.60% and FCR 1.45 while the total harvest at DOC 83 produced ABW 13.81 gr, SR 76.34% and FCR 1.42.	Annisa <i>et al.</i> , 2021

Based on a review of the literature found about microorganisms that play a role in the formation of flocs as follows:

Table 2. Microorganisms that Play a Role in the Formation of Floc

No.	Microorganism	Explanation	Source
1	<i>Bacillus</i> and <i>Streptococcus</i>	Lactic acid bacteria from the genera <i>Bacillus</i> and <i>Streptococcus</i> play a role in the formation of flocs in the cultivation environment with the addition of mollase, which is the source of carbon.	Simangunsong <i>et al.</i> , 2022
2	<i>Lactobacillus plantarum</i>	The application of the biofloc system is carried out with the help of fermentation of <i>Bacillus</i> sp.	Febriyanti <i>et al.</i> , 2018

No.	Microorganism	Explanation	Source
		and <i>Lactobacillus plantarum</i> .	
3	<i>Zoogloea</i> sp.	Bacteria that are able to form bioflocs include <i>Bacillus subtilis</i> , <i>Bacillus cereus</i> , <i>Zoogloea ramigera</i> , <i>Escherichia intermedia</i> , <i>Paracolobacterium aerogenoids</i> , <i>Flavobacterium</i> , <i>Pseudomonas alcaligenes</i> , <i>Sphaerotillus natans</i> , <i>Tetrad</i> , and <i>Tricoda</i> sp.	Rita <i>et al.</i> , 2022

Based on the literature obtained about the use of round ponds in shrimp farming, what microorganisms play a role in the process of forming flocs for aquaculture, the following literature is found based on the use of bioflocs for shrimp cultivation:

Table 3. Utilization of Biofloc for Shrimp Farming

No.	Aspects	Explanation	Source
1	Water use and quality	Biofloc technology is a technology developed for waste management from cultivation and reducing the amount of water used.	Aminin <i>et al.</i> , 2023
		The application of biofloc technology is able to reduce ammonia and nitrite levels in water and successfully improve the efficiency of nutrient utilization.	Fauzi <i>et al.</i> , 2023
		In aquaculture practices, this technology is reported to have been successful in maintaining the quality of cultivated water, can be a biocontrol in the environment, a source of nutrients for fish, and can be an alternative in reducing environmental problems due to the addition of various chemicals in the aquatic environment so that it is expected to support safe and sustainable cultivation for the long term.	Marlida, 2020
2	Natural feed	Biofloc utilizes the activity of heterotrophic and autotrophic microorganisms to convert organic waste into floc and be used as fish feed.	Wanja <i>et al.</i> , 2020
		The use of biofloc in fish farming for the efficiency of aquaculture production costs because biofloc is used as a feed supplement.	Rita <i>et al.</i> , 2022
3	Growth and Productivity of Shrimp	The application of biofloc technology is able to improve the growth and survival performance produced in a stocking density of 5000 heads (283 heads per cubic meter) and provide the highest harvest size and profit rate.	Fauzi <i>et al.</i> , 2023

No.	Aspects	Explanation	Source
		The use of biofloc systems with the addition of probiotics improves the survival and growth of vannamei shrimp.	Dahlan <i>et al.</i> , 2017
		The productivity of fresh vannamei shrimp with a biofloc system is quite high when compared to the productivity of other shrimp farming in freshwater media.	Senggagau <i>et al.</i> , 2023

DISCUSSION

The Round Pond is a pond for fish farming activities with a circular shape. The construction of the round pond uses wiremesh type iron which is then coated with HDPE plastic with various diameters according to the needs of the desired cultivation activities. Based on the results of the literature review found, round ponds have many functions that are very helpful in cultivation activities compared to other types of ponds.

Shrimp cultivation with round pond construction is considered more effective than other types of cultivation ponds. In addition, with its construction that forms a circle, it is able to control and regulate oxygen levels in the pool. So that vannamei shrimp cultivation activities are more optimal.

According to Farida *et al.*, 2019 Biofloc is a collection of several types of organisms. Examples include fungi, bacteria, algae, protozoa, worms, and others that form clumps. Biofloc is formed through the process of stirring organic matter by an aeration system that is dissolved in a pool of water and stimulates aerobic heterotrophic bacteria that attach to organic particles, then decomposes organic matter by taking C-organic compounds and absorbing minerals such as ammonia, phosphate and other nutrients. This condition allows beneficial bacteria to multiply properly. These bacteria will form a consortium and floc will form, then the result is better water quality and organic matter is recycled into floc that can be eaten by fish (Nur *et al.*, 2024).

The cultivation of vannamei shrimp in round ponds can be collaborated with the application of biofloc technology. This aims to increase shrimp production, increase stocking density and optimize feed use. The biofloc system is one of the ways of cultivation using bacteria as a support in the fish acceleration process (Dediyanto *et al.*, 2019).

Based on the results of literature studies, the implementation of vannamei shrimp farming activities in round ponds with a biofloc system can increase economic benefits in a sustainable manner, improve the health of products produced with environmentally friendly technological innovations, provide access to household-scale businesses (small-scale artisanal fisheries), and open market access (Adibrata *et al.*, 2022).

CONCLUSION

Based on a literature study, it was found that vannamei shrimp cultivation in round pond media with biofloc technology is very effective for shrimp growth. The productivity of vannamei shrimp in round ponds with the application of biofloc technology increases and can make feed efficient.

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