



Strengthening of VANNAME (*Litopenaeus vannamei*) seeds that are preserved in cement seeds through the application of FITOIMUN®

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Abstract

The purpose of this study was to evaluate the addition of FITOIMUN® made of acid shrimp extract (*Solanum ferox*) and key interviews (*Boesenbergia pandurata*) on survival, absolute weight growth, daily growth rate, feed conversion rate, and water quality parameters of the vandame shrimpsined in cement tanks. This study uses a complete random design (RAL) with 3 treatments and 3 repetitions. The doses of FITOIMUN® used in the treatment are 0 mL/kg (P0), 20 mL/kg (P1), and 24 mL (P2). The shell used is 20±0,5 g and is kept in a cement tank of 4.5 x 5.5 x 95 m2. The shrimp are treated with a feeding rate method with a frequency of four times a day. The results of the study show survival at P0, P1, and P2 doses of 100%. Absolute weight growth at P0 (7.41 g), P1 (7.69 g), and P2 (6.85 g). The daily growth rate is P0 (26.47%), P1 (27.48%), and P2 (24.46%), while feed conversion rates are P0 (1,16), P1, (1,14), and P2, respectively. (1,18). The water quality in this study averaged 26.92°C, pH 7.39, DO 6.33 ppm, and salinity 19.55 ppt. In conclusion, the survival rate with the administration of FITOIMUN® to shrimps in all treatments reached 100%; the application of Fitoimun® did not affect absolute weight growth, daily growth rate, or feed conversion rate but had the best value at P1 (20 mL/kg feed); and the water quality parameters in all treatments were still at the appropriate criteria for the life of the vaname shrimp.

Keywords: Fitoimun®, Growth, Key Found, Acid Shrimp, Vanname Shrimp (*Litopenaeus vannamei*)

1. Introduction

Vanname shrimp, or white shrimp, is a species of shrimp that originates in Central and South American countries and has been widely cultivated in Indonesia. The Vanname shrimp is a species of shrimp of high economic value. In addition, this type of shrimp has several advantages: resistance to disease attacks, high levels of productivity, and the ability to live in environments with high temperatures, dissolved oxygen, and relatively low salinity. (Sudrajad, 2011).

This is what drives the growing activity of Vanname shrimp cultivation, both in shrubs and bioflok as well as in concrete and cement barrels. As the cultivation activity increases, the watermelon can sometimes cause some problems, such as disease attacks caused by pathogens. Rohmin et al. (2017) stated that pathogenic organisms that can inhibit shrimp cultivation include bacteria, viruses, fungi, and parasites, especially viruses (Sudaryono et al., 2015) and bacteria (Sivagnanavelmurugan et al., 2012), that

can cause mass deaths in shrimp cultivation. This requires appropriate solutions, one with the addition of immunostimulants. FITOIMUN® is an immunostimulant based on keys (*B. pandurata*) and acidic acid (*S. ferox*). Keys and acid acid contain saponins, flavonoids, and carbohydrates that have the ability to act as immune stimulants. They also contain phenols, phenolic acids, tannins, and terpenoids that have antibacterial effects. (Hardi et al., 2017). The administration of FITOIMUN® can enhance the body resistance of fish and shrimp to resist extreme water quality changes, attack pathogens, and increase crop production. The administration of immunostimulants can activate the non-specific immune system of cells, such as hemosites in avertebrata. (Dugger and Jory, 1999). In previous studies, the use of *B. pandurata* extract as an antibacterial and immunostimulant had a positive effect on the survival increase of 100% after being infected with *A. hydrophila* bacteria, as well as the administration of *S. ferox* by injection to Nile fish, which also showed an improvement in survival after

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infection with *Pseudomonas* sp. (Hardi et al., 2017). In addition, the application of a combination of extracts *B. pandurata* and *S. ferox* through injections has a positive impact on the survival of Nile and also increases the number of white blood cells, so that it can reduce infections with bacteria *A. hydrophila* and *pseudomonas*. (Hardi et al., 2017).

2. Material and Methods

2.1. Time and Place

This study was conducted in January–February 2022. Located in Hatchery Benur Idaman Jawi-Jawi, Muara Badak Ulu Village, Muala Badak District, Kutai Kartanegara District, East Kalimantan Province, Indonesia. The shrimp was kept as a test animal for 28 days. The weight of the shrimp is measured every seven days. The method used in this study is Complete random design (RAL) with 3 treatments and 3 repetitions of the given FITOIMUN® dose it is P0 = 0 mL/kg, P1 = 20 mL/kg, and P2 = 24 mL per kg of feed.

2.2. Giving and Preparing Food

The shrimp was kept as a test animal for 28 days. Feeding was done. Four times a day at 7:00, 1:00, 7:00, and 1:00. Test feed preparation was used. During the research, a commercial SGH shrimp grower (JAPFA®) produced protein pellets of 32%. They are given according to the need of the shrimp, which is five percent of the body weight, and then fed to them. Weigh and mix with FITOIMUN®, which has been diluted with water and dry in the air for 20 minutes.

2.3. Data Analysis

The data obtained are survival rate, absolute weight gain, and speed, daily growth, feed conversion rate, and. Data processed using Microsoft Excel 2010 and statistical testing was done with SPSS version 25. The data is then analyzed for homogeneity and further analyzed. by using ANOVA (single factor) at a 95% confidence rate. Duncan's test was done, to find out the best treatment once it is known there are real differences between treatments. Supporting data, such as water quality, is summarized in table form and analyzed descriptively. The calculation of the shrimp survival value is done using the formula according to Effendi (2002), absolute weight growth and daily rate of growth of shrimp calculated by method Zonneveld et al. (1991), and the calculation of the feed conversion ratio was done using the Effendie formula. (1997), as well as water quality parameters measured include water temperature, dissolved oxygen/DO, pH, and salinity. Measured in the morning, in the afternoon, and in the evening, every three days, once in the place. (insitu).

3. Results and Discussion

3.1. Results

3.1.1 Survival Rate

Observations of survival and growth of FITOIMUN®-administered vanamei shrimp kept in cement tubs during the study can be seen in Table 1 as follows:

Treatment	Parameters			
	SR(%)	Absolute Weight	SGR(%days)	FCR
P0	100	7.41	26.47	1.16
P1	100	7.69	27.48	1.14
P2	100	6.85	24.46	1.18

Note: SR: Survival Rate; SGR: Spesific Growth Rate; FCR: Food Conversion Rate

3.1.2. Water Quality

The results of measuring water quality parameters during the research show that temperature, pH, dissolved oxygen, and salinity were still in suitable conditions for vannamei shrimp cultivation, which can be seen in Table 2 as follows:

Table 2. Water Quality

Parameters	Week				Average
	1	2	3	4	
Temperature (°C)	25.30-27.70	20.40-28.80	25.30-28.20	25.40-28.60	26.92
pH	7.15	7.26	7.42	7.52	7.39
DO (ppm)	5.00	6.00	7.00	7.00	6.33
Salinity (ppt)	18.40-19.10	18.90-19.70	19.80-20.10	19.90	19.55

Note: The table above is the average value for all treatments

3.2. Discussion

3.2.1. Survival Rate

Table 1 shows the survival rate for vannamei shrimp during the study of 100%, both for shrimp that were not given the extract and those that were given extracts of key curcuma and tamarind eggplant. Monitoring water quality, such as dissolved oxygen, pH, temperature, and salinity, during the research carried out every 3 days. The water used for rearing is first settled and given aeration to increase oxygen.

This research uses a low stocking density of 10 fish/m³ with a shrimp weight of 20 ± 0.5 g, which aims to avoid deaths caused by shrimp cannibalism. At high densities, there is often competition between shrimp for food, which results in shrimp preferring to prey on members of the same species because there is not enough food provided, which results in uneven growth and high mortality rates. This is in accordance with the statement of Muzaki (2004), which states that the decreasing survival rate of shrimp is caused by high stocking density, which will increase competition for shrimp in getting food, space, living space, and oxygen. And shrimp have the characteristic of cannibalism, namely that they like to prey on members of the same sex (Hidayat et al., 2013).

3.2.2. Absolute Weight Growth

Based on the results of research carried out during the 28 days of rearing vanname shrimp, The average absolute weight growth of vanname shrimp ranges from 6.85 to 7.69 g (Table 1). The results of the analysis of variance (ANOVA) of vanname shrimp weight growth showed that the results were not significantly different ($P < 0.05$). Even though it was not statistically different, treatment P1 with the administration of FITOIMUN® 20 mL/kg feed relatively provided better absolute weight growth for vannamei shrimp compared to treatments P0 (0 mL/kg) and P2 (24 mL/kg feed). Absolute weight gain every week ranges from 1–2.5 g; this result is in accordance with the statement of Supono (2006), which states that good vanname shrimp growth ranges from 1–1.5 g/week.

Shrimp weight growth is influenced by the level of feed consumption, where the level of feed consumption determines which nutrients enter the body, which are then used for growth and other needs (Gunarto and Hendrajat, 2008). Apart from that, the addition of FITOIMUN® also has an effect on growth because FITOIMUN® contains alkaloids, flavonoids, and carbohydrates. FITOIMUN® is made from extracts of key cucumber (*B. pandurata*) and sour eggplant (*S. ferox*), which function as a natural immunostimulant that is able to increase the immune system of fish and shrimp (Hardi et al., 2017), by maintaining shrimp immunity so that there are no disturbances that inhibit the growth of vanname shrimp.

3.2.3. Daily Growth Rate

In Table 1, in line with the results of absolute weight growth measurements, the percentage of daily growth rate for vannamei shrimp increased in the treatment given FITOIMUN® by 20mL/kg feed. Meanwhile, the results of the analysis of variance (ANOVA) showed that it was not significantly different. ($P > 0.05$). Based on the statement by Arief et al. (2014), the use of plant extracts can help increase the number of good bacteria in the intestines of fish, thereby increasing feed digestibility. The use of sour eggplant extract, which contains carbohydrates, can increase the number of *Lactobacillus casei* bacteria in the intestines of catfish. This is because tamarind eggplant extract is able to modulate the growth of the gut microbiota of *Lactobacillus casei* bacteria, which plays a role in increasing growth, survival rate, feed efficiency, and the composition of beneficial bacteria in the fish digestive tract (Merrifield et al., 2010). As immunity increases and also good digestive conditions so that metabolic processes can run well and Feed can be absorbed well by shrimp; this is confirmed by the opinion of Zhang et al. (2012) that the ingredients contained in tamarind and ginger eggplant extracts can

help digestion in fish and also increase the growth of fish and shrimp.

3.2.4. Feed Conversion Rate

The results of observing the feed conversion rate show that the feed conversion value was obtained at P1 (20 mL/kg feed), which is 1.14, then treatment P2 (24 mL/kg feed), which is 1.18 and treatment P0 (0 mL/kg feed), which is 1.16. This condition shows a good feed conversion rate range, namely in the range of 1.14–1.18. Meanwhile, the results of the analysis of variance (ANOVA) showed that there was no significant difference ($P < 0.05$). The low feed conversion value is very dependent on the shrimp's ability to absorb food, so an ingredient is needed that can act as a prebiotic and supplement. for good bacteria (probiotics) in shrimp digestion; in this case, FITOIMUN® can increase the growth of *Lactobacillus casei* bacteria, which are good bacteria for fish (Hardi et al., 2016). By increasing good bacteria in the shrimp digestive system, it is thought to be able to increase the ability of shrimp to utilize feed. According to Verschuere et al. (2000), probiotic bacteria are live microbes that can increase the utilization of feed nutrients, improve the immune system, and improve the quality of the host's living environment.

3.2.4. Water Quality Parameters

The average temperature during the rearing period of vannamei shrimp in cement tanks ranges from 25 to 28 °C. These results show that the temperature during the rearing of vannamei shrimp is within the normal range. This is in accordance with the statement by Briggs et al. (2004), which states that the ideal temperature conditions for the life of vaname shrimp are in water that has a temperature of around 26–32 °C. Low temperatures below 20 °C in cultivating vannamei shrimp can cause slowed metabolism and decreased shrimp appetite (Boyd, 1989), whereas if the temperature is higher than the optimal temperature range, it will increase the toxicity of dissolved substances, which then increases the need for oxygen from increasing body temperature, as well as increasing the metabolic rate as a result of the need for dissolved oxygen.increasing (Briggs et al., 2004).

The degree of acidity (pH) is the negative logarithm of hydrogen ion activity. The pH value of the water during the research ranged from 7.15 to 7.52. These results show that the pH is in the normal range; this is in accordance with the pH of pond water that is good for cultivating vaname shrimp, namely 7.50–8.50. Effendi (2000) stated that most aquatic biota are sensitive to changes in pH. pH values that are too low (<4.5) and too high (>9.0) can cause shrimp to get sick easily, decrease appetite, and even make shrimp tend to become porous and mossy. If the pH shows a value of 10, then it will be lethal for fish and shrimp (Boyd, 1990).

The average salinity value during the study was around 18–20 ppt. This is in accordance with the salinity requirements of vanname shrimp, namely that young shrimp aged 1–2 months require a salt level of 15–25 ppt for optimal growth. After more than 2 months of age, shrimp growth is relatively good at salinity between 5 and 30 ppt (Haliman and Adijaya, 2005). Salinity is one of the environmental parameters that influences shrimp biological processes and will directly influence the lives of aquatic organisms, including growth rate, amount of food consumed, food conversion value, and survival (Andrianto, 2005).

4. Conclusion

Based on the results of research on the application of FITOIMUN® to increase the growth of vanname shrimp, it can be concluded that by administering FITOIMUN® to vanname shrimp in all treatments, survival reached 100%, absolute weight growth (PBM) had the best value at P1 (20 mL/kg feed), which is 7.69 g ($P < 0.05$), and then the daily growth rate (LPH) has the best value, namely P1 (20 mL/kg feed), which is 27.48%/day ($P < 0.05$), as well as at the level of feed conversion ($P > 0.05$), but had the best value at P1 (20 mL/kg feed), namely 1.14 ($P > 0.05$). Water quality parameters in all treatments during maintenance were still within the criteria suitable for the life of white vannamei shrimp.

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