Fisheries Journal, 15 (3), 1343-1355 (2025)
http://doi.org/10.29303/jp.v15i3.1500

ANALYSIS OF FLUCTUATIONS IN TOTAL ORGANIC MATTER (TOM) AND N/P RATIO ON THE GROWTH OF VANAME SHRIMP (*Litopenaeus vannamei*)

Analisis Fluktuasi Total Organic Matter (Tom) Dan Rasio N/P Terhadap Pertumbuhan Udang Vaname (Litopenaeus vannamei)

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(Received April 12th 2025; Accepted June 20th 2025)

ABSTRACT

Whiteleg shrimp are superior in aquaculture due to their high survival rates in intensive cultivation systems, but the use of artificial feed increases aquatic organic matter, reducing dissolved oxygen and causing ecosystem instability. This oxygen depletion affects the survival, growth, and average daily growth (ADG) of the shrimp. Therefore, this study will present data on the correlation between Total Organic Matter (TOM) and the N/P ratio as the end product of the decomposition of organic matter on ADG vaname shrimp body weight gain from intensive shrimp ponds in Banyuwangi, East Java. Data sampling was carried out in 11 intensive rearing ponds at the age of 20 – 60 days of shrimp culture. Data correlation will be analyzed by correlation test using SPSS. The TOM obtained was in the range of 60.67 – 69.52 mg/l. The N/P ratio value obtained is 1.25 – 25.33. The ADG value obtained is 0.15 – 0.59 grams/day. The correlation between TOM and ADG shows a correlation coefficient of 0.468 which states that there is a positive correlation with a moderate level of correlation. The correlation between the N/P ratio and ADG shows a correlation coefficient of 0.066 which states that the results are negative or there is no correlation. The correlation between Total Organic Matter (TOM) and Average Daily Gain (ADG) indicates that an increase in TOM within certain limits can still support shrimp growth. Meanwhile, the correlation between the N/P ratio and ADG does not affect the growth rate of shrimp.

Key words: ADG (average daily growth), intensive culture, TOM (total organic matter), whiteleg shrimp, Integrated Multi-Trophic Aquaculture

ABSTRAK

Udang vaname lebih unggul dalam akuakultur karena tingkat kelangsungan hidupnya yang tinggi dalam sistem budi daya intensif, tetapi penggunaan pakan buatan meningkatkan bahan organik air, mengurangi oksigen terlarut dan menyebabkan ketidakstabilan ekosistem. Penipisan oksigen ini memengaruhi kelangsungan hidup, pertumbuhan, dan pertumbuhan

harian rata-rata (ADG) udang.Oleh karena itu, penelitian ini akan menyajikan data tentang korelasi antara *Total Organic Matter* (TOM) dan rasio N/P sebagai hasil akhir dekomposisi bahan organik terhadap pertambahan bobot badan ADG udang vaname dari tambak udang intensif di Kabupaten Banyumas, Jawa Timur. Pengambilan sampel data dilakukan di 11 tambak pemeliharaan intensif pada umur budidaya udang 20 – 60 hari. Korelasi data akan dianalisis dengan uji korelasi menggunakan SPSS. TOM yang diperoleh berada pada kisaran 60,67 – 69,52 mg/l. Nilai rasio N/P yang diperoleh sebesar 1,25 – 25,33. Nilai ADG yang diperoleh sebesar 0,15 – 0,59 gram/hari. Korelasi antara TOM dan ADG menunjukkan koefisien korelasi sebesar 0,468 yang menyatakan terdapat korelasi positif dengan tingkat korelasi sedang. Korelasi antara rasio N/P dan ADG menunjukkan koefisien korelasi sebesar 0,066 yang menyatakan hasil negatif atau tidak terdapat korelasi. Korelasi antara Total Organic Matter (TOM) dan Average Daily Gain (ADG) menunjukkan bahwa peningkatan TOM dalam batas tertentu masih dapat mendukung pertumbuhan udang. Sedangkan korelasi antara rasio N/P dan ADG tidak mepengaruhi laju pertumbuhan udang.

Kata Kunci: ADG (*average daily growth*), budidaya intensif, *Litopenaeus vannamei*, udang vanamei, Budidaya Multi-Tropik Terpadu

INTRODUCTION

Whiteleg shrimp (*Litopenaeus vannamei*) is an introduced species that has begun to be developed in Indonesia because it excels in the cultivation sector. Whiteleg shrimp excels in the cultivation sector because it has high survival in intensive cultivation systems. Intensive cultivation is characterized by the application of high stocking densities to obtain higher productivity (Mahasri *et al*., 2018). Based on research by Yunarty and Renitasari (2022), the survival of whiteleg shrimp in an intensive cultivation density system of 150-300 fish/m² shows a percentage of 76-86%. This percentage is a high survival percentage according to Widigdo and Wardianto (2013), the high survival of whiteleg shrimp ranges from >70%. One of the characteristics of an intensive cultivation system is the application of high artificial feed to accelerate the growth rate of whiteleg shrimp (Widanarni *et al*., 2012). High application of artificial feed will affect the increase in organic matter in the waters, most of which comes from leftover feed, leftover fertilizer, and waste metabolism of whiteleg shrimp, plankton, and algae in the waters (Rahadini and Dewi, 2021).

The increase in organic matter will increase the rate of decomposition and cause turbidity which will inhibit the penetration of light into the waters as the main energy source for photosynthesis to produce dissolved oxygen. The increase in the rate of decomposition will also reduce the concentration of dissolved oxygen the main factor needed by aerobic microorganisms to decompose organic matter (Fahrur *et al*., 2009).

The decrease in the concentration of dissolved oxygen in waters caused by the increase in organic matter will have a significant impact on the instability of the ecosystem of the whiteleg shrimp maintenance media. Ecosystem instability will affect the decrease in the survival rate and growth rate of shrimp (Mangampa and Suwoyo, 2010). Growth is a measure of the success of whiteleg shrimp cultivation productivity with the main indicator being body weight (Supito, 2017). Shrimp body weight can be determined by calculating ABW (Average Body Weight) or average body weight. To obtain high ABW, it is necessary to carry out regular monitoring of shrimp body weight gain by calculating ADG (Average Daily Growth) (Pratama *et al*., 2017). Research objectives to determine the correlation between total organic matter (BOT) with ADG (Average Daily Growth) or average body weight gain of vaname shrimp (Litopenaeus vannamei) per sampling period in intensive shrimp ponds in Banyuwangi, East Java. Knowing the correlation between the N / P ratio with ADG (Average Daily Growth) or

average body weight gain of vaname shrimp (Litopenaeus vannamei) per sampling period in intensive shrimp ponds in Banyuwangi, East Java. The novelty of this study lies in its application to intensive aquaculture, characterised by high stocking density, high-protein feed, and controlled water quality. Observation of changes in TOM and N/P ratio in relation to growth will provide information for maximising aquaculture productivity.

RESEARCH METHODS

Time and Place

The research was conducted in intensive shrimp ponds and laboratories of PT. Surya Windu Kartika Bomo A, Banyuwangi, East Java. The research was conducted from August to October 2021.

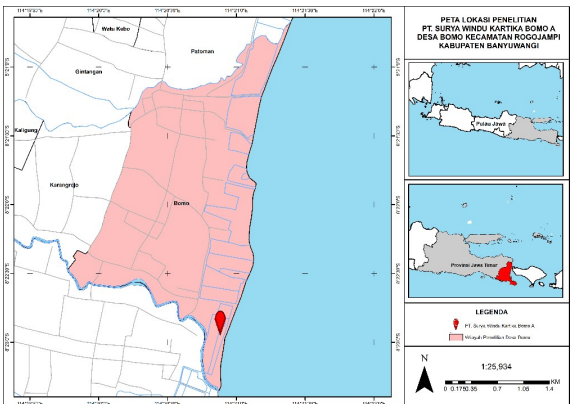


Figure 1. Research site.

Methods

The tools in this study were: water sample bottles, 10 ml measuring pipettes, bulb fillers, 250 ml Erlenmeyer flasks, 50 ml Erlenmeyer flasks, thermometers, electric stoves, burette stands, feeding tray, digital scales, pH paper, DO meters, dropper pipes and cuvette glasses. The materials in this study were: whiteleg shrimp, water samples for maintenance media, 0.01 N oxalic acid C2H2O4, 4N sulfuric acid H_2SO_4, 0.01 N potassium permanganate $KMnO_4$, and NH_4^+, NO_2, NO3-, and PO_4^{3-} test kit reagents.

Procedure

Sampling was conducted in 11 active shrimp ponds of PT. Surya Windu Kartika Bomo A at DOC (Day of culture) or maintenance age of 20-60 days. Sampling was conducted in the middle of the pond. Water quality sampling was conducted by tying the sample bottle to the Secchi disk stick and submerging it to the depth of the water's brightness level. Sampling of whiteleg shrimp body weight was conducted using a feeding tray and weighed (Haliman and Adijaya, 2005).

Observation Parameters

The main parameters of water quality observed were total organic matter (TOM) and the N/P ratio. Supporting parameters of water quality observed consisted of weather, temperature, pH, DO (Dissolved Oxygen) or dissolved oxygen, ammonium (NH_4^+), nitrite (NO_2), nitrate (NO3-), and phosphate (PO_4^{3-}).

The calculation of the N/P ratio can be obtained from the measurement results of ammonium (NH4+), nitrite (NO2-), nitrate (NO3-), and phosphate (PO_4^{3-}). The following is the calculation of the N/P ratio according to Nijverdal (2009).

Rasio N : P = TN : TP

$TN = N\ (NH_4^+) + N\ (NO_2^-) + N(NO_3^-)$

$TP = P\ (PO_4^{3-})$

$TN = \frac{a\ x\ 14}{18} + \frac{b\ x\ 14}{46} + \frac{c\ x\ 14}{62}$

$TP = \frac{d\ x\ 31}{95}$

Where:
14 = atom mass of N
18 = atom mass of $NH4^+$
31 = atom mass of P
46 = atom mass of $NO2^-$
62 = atom mass of $NO3^-$
a = concentration of $NH4^+$
b = concentration of $NO2^-$
c = concentration of $NO3^-$
d = concentration of $PO4^{3-}$

The main parameter of the observed body weight of whiteleg shrimp is ADG (Average Daily Growth) or the average increase in body weight of shrimp per sampling period. The calculation of ADG according to Haliman and Adijaya (2005) is as follows.

$$ADG = ABW_1 - ABW_0$$

Where:
ADG = average daily growth (g / day)
ABW_1 = final average body weight (g)
ABW_0 = initial average body weight (g)

The supporting parameter of the observed whiteleg shrimp body weight is ABW (Average Body Weight). The calculation of ABW according to Haliman and Adijaya (2005) is as follows.

$$ABW = \frac{\text{total weight of the sample}}{\text{the number of samples}}$$

Data Analysis

Water quality data analysis was carried out by comparing the results of sample measurement data with optimal water quality standards for intensive cultivation of whiteleg shrimp according to PERMENKP No. 75 of 2016. Correlation analysis between total organic matter (TOM) and the N/P ratio with ADG (Average Daily Growth) or average body weight gain of whiteleg shrimp per sampling period was carried out using correlation and regression tests using the SPSS Windows 20.0 software (Arofah *et al.*, 2021).

RESULT

Total Organic Matter (TOM)

Total organic matter (TOM) is the accumulation of organic residues in cultivated waters originating from feed, organic fertilizers, plankton, and algae (Rahadini and Dewi, 2021). The TOM concentration obtained is in the range of 60.67 - 69.52 mg/L. This concentration is a good concentration for intensive whiteleg shrimp farming according to PERMENKP No. 75 of 2016, the concentration of TOM which is good for intensive vaname shrimp farming is in the

range below 90 mg/L. The following is a graph of BOT fluctuations in 11 active whiteleg shrimp farming ponds.

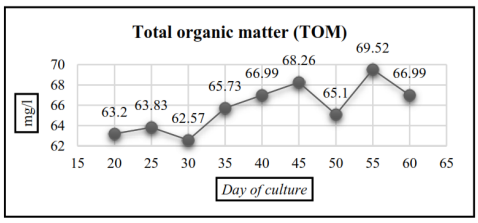


Figure 2. TOM in pond number 1.

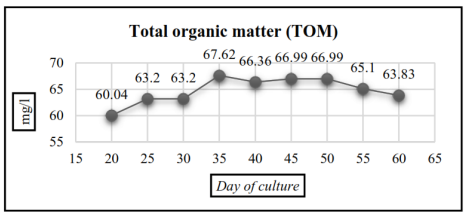


Figure 3. TOM in pond number 2.

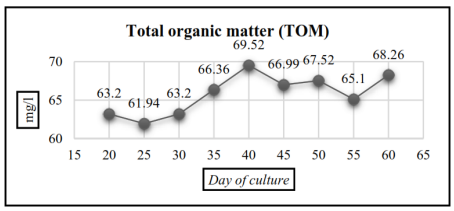


Figure 4. TOM in pond number 3.

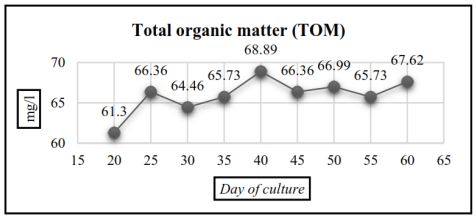


Figure 5. TOM in pond number 4.

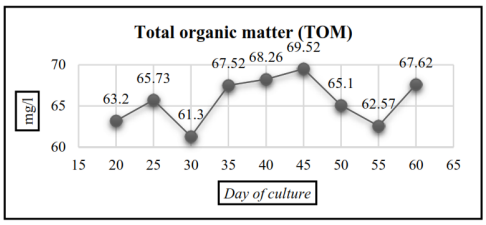


Figure 6. TOM in pond number 5.

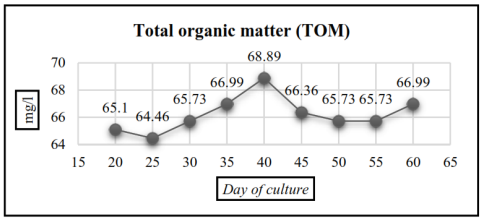


Figure 7. TOM in pond number 6.

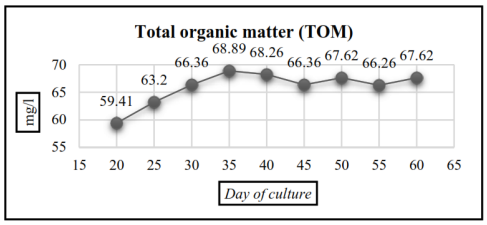


Figure 8. TOM in pond number 7.

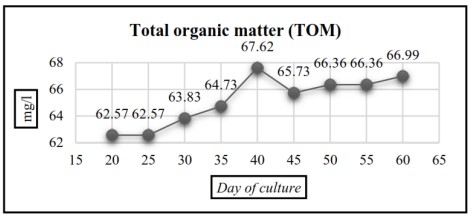


Figure 9. TOM in pond number 8.

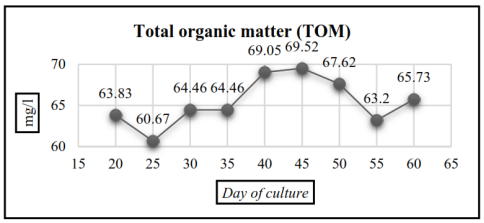


Figure 10. TOM in pond number 9.

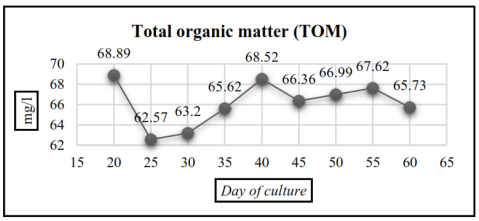


Figure 11. TOM in pond number 10.

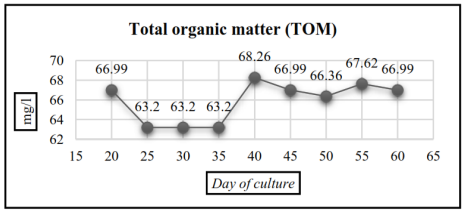


Figure 12. TOM in pond number 11.

N/P Ratio

The N/P ratio is the comparison between the concentration of nitrogen and inorganic phosphorus in water. The N/P ratio is 1.25 - 25.33. The N / P ratio value is obtained from the concentration of ammonium, nitrite, nitrate, and phosphate in the waters. The ammonium concentration obtained is 0 - 3.9 mg/L, this ammonium concentration is not good for intensive cultivation of vaname shrimp because the ammonium concentration reaching 0.2 mg/L can inhibit the growth of vaname shrimp (Faturohman *et al*., 2016). The nitrite concentration obtained is 0 - 0.25 mg/L, this nitrite concentration is good for the intensive cultivation of vaname shrimp because the nitrite concentration of 0.1 - 1 mg/L supports the growth of vaname shrimp (Suwoyo and Mangampa, 2010). The nitrate concentration obtained is 0 - 3 mg/L, this nitrate concentration is good for the cultivation of intensive vaname shrimp because the nitrate concentration of 0.9 - 3.5 mg/L supports the growth of vaname shrimp (Patty *et al*., 2015). The phosphate concentration obtained was 0 - 2.3 mg/L, the phosphate concentration is not good because according to the Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number: 75 2016 concerning General Guidelines for the Enlargement of tiger shrimp (*Penaeus monodon*) and whiteleg shrimp (*Litopenaeus vanname*), that a good phosphate concentration for intensive cultivation of vaname shrimp is less than 0.01 mg/L. The following is a graph of the fluctuation of the N / P ratio in 11 active ponds for the enlargement of whiteleg shrimp.

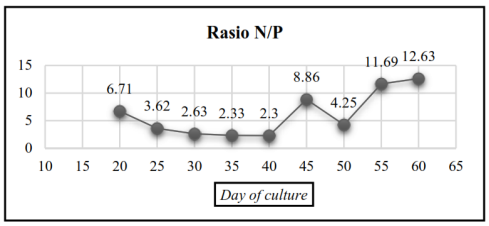


Figure 13. N/P ratio in pond number 1.

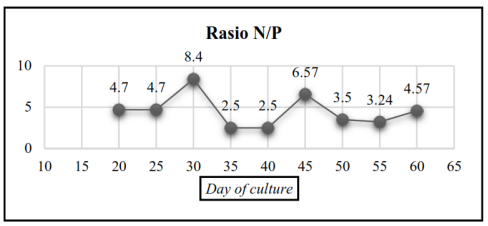


Figure 14. N/P ratio in pond number 2.

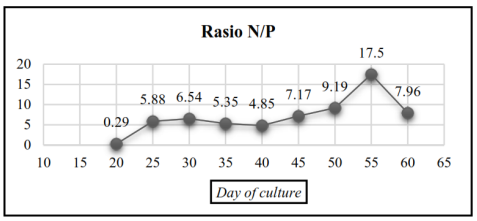


Figure 15. N/P ratio in pond number 3.

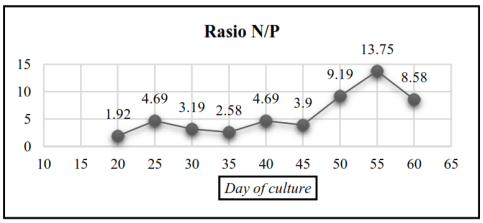


Figure 16. N/P ratio in pond number 4.

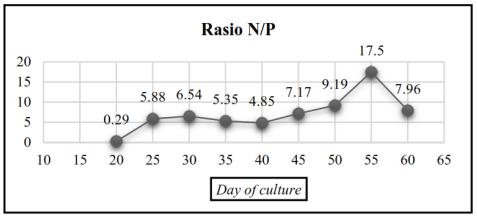


Figure 17. N/P ratio in pond number 5.

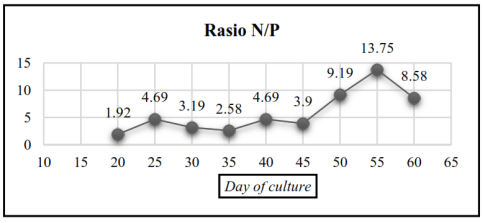


Figure 18. N/P ratio in pond number 6.

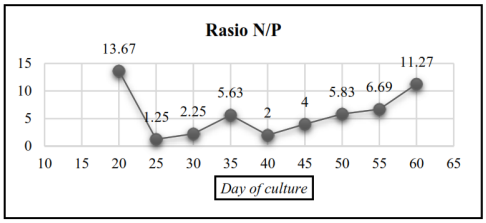


Figure 19. N/P ratio in pond number 7.

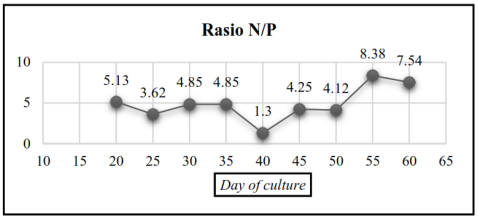


Figure 20. N/P ratio in pond number 8.

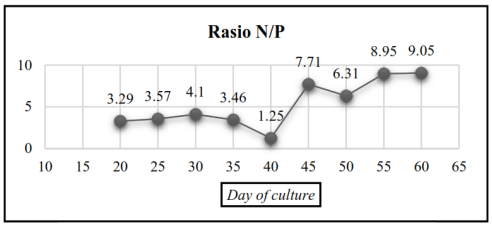


Figure 21. N/P ratio in pond number 9.

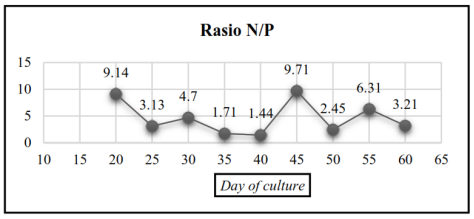


Figure 22. N/P ratio in pond number 10.

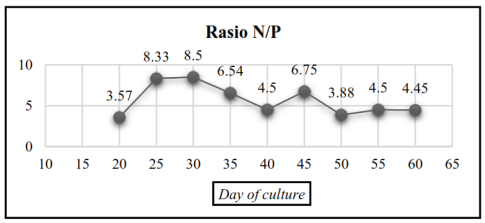


Figure 23. N/P ratio in pond number 11.

Average Daily Growth (ADG)

ADG (Average Daily Growth) is a parameter to determine the average weight gain of whiteleg shrimp per sampling period (Witoko *et al*., 2018). The ADG value obtained is 0.15-0.59 grams/day. The ADG value shows a better ADG value than the optimal ADG target according to SNI No. 01-7246 (2006) which is 0.15 - 0.20 grams/day.

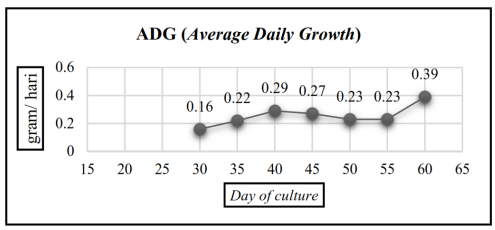


Figure 24. ADG in pond number 1.

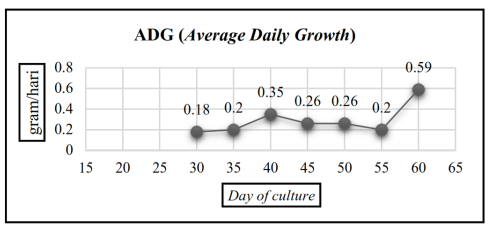


Figure 25. ADG in pond number 2.

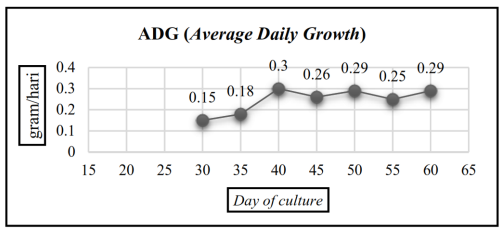


Figure 26. ADG in pond number 3.

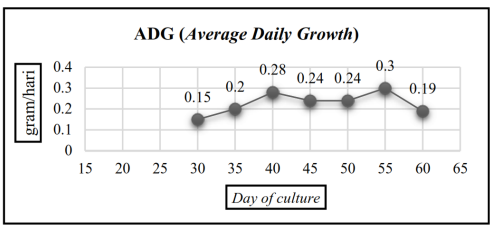


Figure 27. ADG in pond number 4.

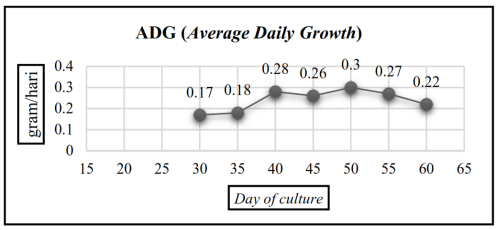


Figure 28. ADG in pond number 5.

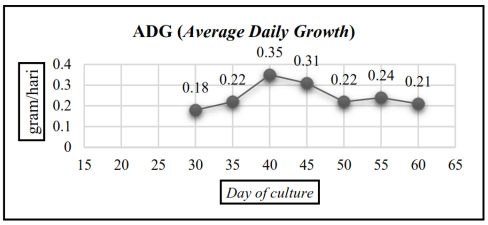
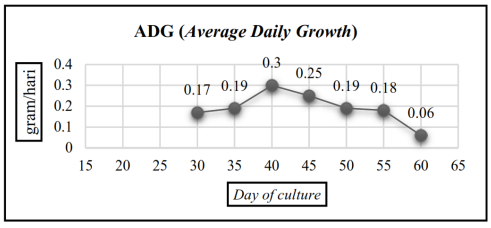


Figure 29. ADG in pond number 6.



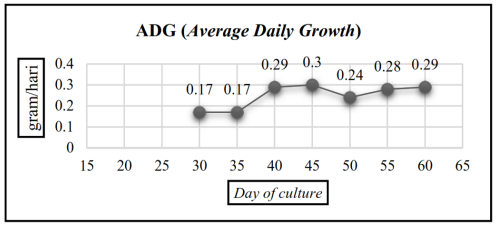


Figure 30. ADG in pond number 7.

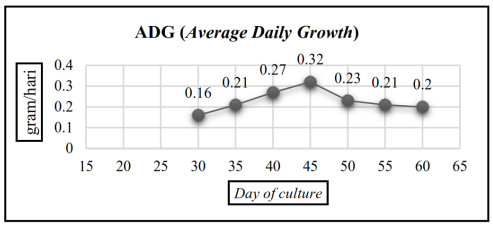


Figure 31. ADG in pond number 8.

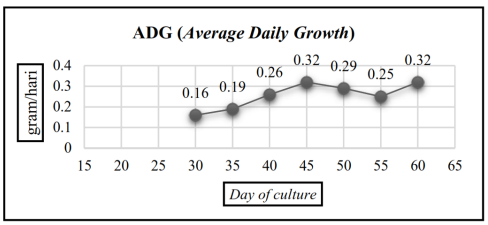


Figure 32. ADG in pond number 9.

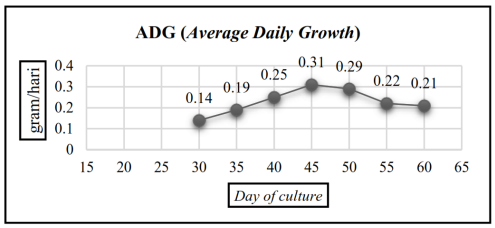


Figure 33. ADG in pond number 10.

Figure 33. ADG in pond number 11.

ADG (Average Daily Growth) is a parameter to determine the average body weight gain of whiteleg shrimp per sampling period (Witoko *et al*., 2018). The ADG value is 0.15 - 0.59 grams/day. The ADG value shows a better ADG value than the optimal ADG target according to SNI No. 01-7246 (BSN, 2006) which is 0.15 - 0.20 grams/day.

DISCUSSION

Total Organic Matter (TOM)

Total organic matter (TOM) is the accumulation of organic residues in cultivated waters originating from feed, organic fertilizers, plankton, and algae (Rahadini and Dewi, 2021). The concentration of TOM is in the range of 60.67 - 69.52 mg/L. Total organic matter comes from feed residues, faeces, and other dissolved organic matter. High levels of organic matter lead to increased microbial activity that uses dissolved oxygen for decomposition, resulting in hypoxic conditions that can suppress shrimp metabolism, disrupt appetite, and reduce shrimp growth. This concentration is a good concentration for intensive cultivation of whiteleg shrimp according to the Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number: 75 / PERMEN-KP / 2016 concerning General Guidelines for Rearing Tiger Shrimp (*Penaeus monodon*) and Whiteleg Shrimp (*Litopenaeus vannamei*), that the concentration of total organic matter (TOM) which is good for intensive cultivation of whiteleg shrimp is in the range below 90 mg/L.

N/P Ratio

The N/P ratio is a comparison between the concentration of nitrogen and inorganic phosphorus in waters. The N/P ratio value is 1.25 - 25.33. The N/P ratio affects the abundance and diversity of phytoplankton, which impacts water quality and shrimp growth. A favourable N/P ratio supports the abundance and diversity of beneficial phytoplankton such as green algae and diatoms, which can increase dissolved oxygen and balance water quality. However, if the N/P ratio is too high or too low, it can trigger the growth of harmful algae such as cyanobacteria, which produce toxins and cause water quality fluctuations. This imbalance can suppress shrimp growth, reduce appetite, and increase stress and the risk of disease.

The N / P ratio value is obtained from the concentration of ammonium, nitrite, nitrate, and phosphate in the waters. The ammonium concentration obtained is 0 - 3.9 mg/L, this ammonium concentration is not good for intensive cultivation of whiteleg shrimp because the ammonium concentration reaching 0.2 mg/L can inhibit the growth of whiteleg shrimp

(Faturohman *et al*., 2016). The nitrite concentration obtained is 0 - 0.25 mg/L, this nitrite concentration is good for the intensive cultivation of whiteleg shrimp because the nitrite concentration of 0.1 - 1 mg/L supports the growth of whiteleg shrimp (Suwoyo and Mangampa, 2010). The nitrate concentration obtained is 0 - 3 mg/L, this nitrate concentration is good for intensive cultivation of whiteleg shrimp because the nitrate concentration of 0.9 - 3.5 mg/L supports the growth of whiteleg shrimp (Patty *et al*., 2015). The phosphate concentration obtained was 0 - 2.3 mg/L, the phosphate concentration is not good because according to the Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number: 75 / PERMEN-KP / 2016 concerning General Guidelines for the Enlargement of Tiger Shrimp (*Penaeus monodon*) and Whiteleg Shrimp (*Litopenaeus vanname*), that a good phosphate concentration for intensive cultivation of whiteleg shrimp is less than 0.01 mg/L.

Correlation of TOM and ADG

The results of the correlation analysis between total organic matter and ADG or the increase in body weight of whiteleg shrimp per sampling period showed a correlation coefficient (R) of 0.468, which states that there is a relationship with a moderate correlation level and a determination coefficient (R square) of 0.219, which states that there is an influence of 21.9%. The level of significance of the correlation analysis results is 0.00 or <0.05 and the calculated t value of 4.581> t table of 1.992 states that TOM has a significant effect on ADG. This occurs because water quality is stable, as shrimp are animals that are influenced by the quality of the water base, dissolved oxygen levels, and sufficient feed availability, rather than fluctuations in the nutrient ratio in the water column. As long as pond management is carried out properly, such as feed management, water circulation, and control of organic matter, the N/P ratio does not become a major limiting factor in shrimp growth.

The correlation between TOM and ADG per sampling period showed positive results with a moderate correlation level. Based on the results obtained, the higher concentration of TOM tends to decrease the ADG value. The decrease in the ADG (Average Daily Growth) value or the value of the body weight gain of whiteleg shrimp as a measure of whiteleg shrimp growth can be caused by the decreasing survival of whiteleg shrimp due to the instability of the aquatic ecosystem. One of the causes of the instability of the aquatic ecosystem is the low concentration of dissolved oxygen. The accumulation of organic residues in the waters can cause turbidity in the waters and inhibit the penetration of light as a source of energy from the photosynthesis process. The photosynthesis process that does not run properly will cause the concentration of dissolved oxygen in the waters to be low because the photosynthesis process is the producer of most of the dissolved oxygen in the waters (Fahrur *et al*., 2009). In addition, the accumulation of organic residues in the waters will be decomposed by microorganisms aerobically. Therefore, dissolved oxygen in water will decrease because it is needed by aerobic microorganisms to break down organic matter into inorganic matter as a form of nutrient that can be reused by aquatic biota (Mangampa and Suwoyo, 2010).

Correlation of N/P Ratio and ADG

The results of the correlation analysis between the N/P ratio and ADG or the increase in body weight of whiteleg shrimp per sampling period showed a correlation coefficient (R) of 0.066, which states that there is no relationship and a determination coefficient (R square) of 0.004, which states that there is an influence of 0.4%. The level of significance of the correlation analysis results is 0.567 or > 0.05 and the calculated t is -0.575 < t table is 1.992 which states that the N/P ratio does not significantly affect ADG.

The correlation between the N/P ratio and ADG showed negative results or no correlation. Based on the results obtained, the fluctuating or stable N/P ratio values did not

cause a decrease or increase in the ADG value. This can be interpreted that the N/P ratio as the final product of the organic matter decomposition process does not directly affect the ADG value. However, the N/P ratio directly affects the dominance and abundance of phytoplankton as the main factors in water fertility (Arofah *et al*., 2021).

Water Quality Analysis

The supporting water quality observed in this study is temperature, pH, DO (Dissolved oxygen), or dissolved oxygen. The water temperature in the morning is in the range of 26 °C - 28 °C and during the day is in the range of 30 °C - 32 °C. The pH of the water in the morning is in the range of 7.6 - 7.8 and during the day is in the range of 7.9 - 8.2. DO of the water in the morning is in the range of 3.79 - 5.11 mg/L and during the day is in the range of 6.32 - 8.01 mg/L. The temperature, pH, and DO values are good for the intensive cultivation of whiteleg shrimp according to PERMENKP No. 75 of 2016.

The controlling factors of the organic material decomposition process consist of dissolved oxygen or DO, pH, and temperature. The organic material decomposition process will run well in aerobic conditions or sufficient dissolved oxygen conditions, namely > 4 mg/L. In addition, the organic material decomposition process will run well if the water temperature is in the range of 30 - 35 °C and the pH is in the range of 7 - 8.5 (Boyd, 2019). Based on these supporting factors, the results of the water quality analysis study obtained showed that DO in the morning was in the range of 3.79 - 5.11 mg/L and during the day was in the range of 6.32 - 8.01 mg/L, water temperature in the morning was in the range of 26 °C - 28 °C and during the day was in the range of 30 °C - 32 °C, and water pH in the morning was in the range of 7.6 - 7.8 and during the day was in the range of 7.9 - 8.2 assuming that the decomposition process during the study went well as one of the factors influencing the fluctuation of organic matter, namely the success of the decomposition process.

Fluctuations in the concentration of TOM in waters can be caused by the weather during the research process. The weather observed during the research process was on DOC (Day of culture) or the age of whiteleg shrimp maintenance on the 40th day - On the 50th and 60th days, it rained in the morning which caused a decrease in temperature, pH and DO or dissolved oxygen in the entire research plot pond. The temperature of the maintenance media that decreased after the rain could be caused by the absence of solar radiation. The temperature decrease only occurred by 1 - 2 °C with the lowest temperature being 26 °C, this temperature is still good for intensive cultivation of whiteleg shrimp (Briggs *et al*., 2002). The pH of the maintenance media that decreased after the rain could be caused by rain being acidic with a pH <6 and carbon dioxide in the air forming a weak acid that will be carried by rainwater to the maintenance media. The pH decrease only occurred by 0.1 - 0.2 with the lowest pH being 7.6, this pH is still a good pH value for intensive cultivation of vaname shrimp according to the Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number: 75 / PERMEN-KP / 2016 concerning General Guidelines for the Enlargement of Tiger Shrimp (*Penaeus monodo*n) and Whiteleg Shrimp (*Litopenaeus vanname*). DO or dissolved oxygen in the maintenance media that decreases after rain can be caused by the absence of sunlight radiation for the photosynthesis process by phytoplankton where most of the dissolved oxygen in the water comes from the results of photosynthesis by phytoplankton (Effendi, 2003). The decrease in DO or dissolved oxygen reached <4 mg/l with the lowest DO of 3.84 mg/l, the DO value is lower than the optimal DO value according to the Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number: 75/PERMEN-KP/2016 concerning General Guidelines for the Enlargement of Tiger Shrimp (*Penaeus monodon*) and Whiteleg Shrimp (*Litopenaeus vanname*) which is> 4 mg/l so that the decrease in DO can affect the fluctuation of TOM in the maintenance media. Rainy weather

that causes dissolved oxygen to decrease will cause the concentration of TOM to increase due to the slow decomposition process and there is runoff of organic matter carried by rain from the air or the environment to the maintenance media.

CONCLUSION

Based on the results of the research that has been carried out, it can be concluded that TOM is correlated and has a direct effect on the weight gain of whiteleg shrimp (*Litopenaeus vannamei*) per sampling period or ADG, and the N/P ratio is not correlated and does not have a direct effect on the weight gain of whiteleg shrimp per sampling period or ADG.

ACKNOWLEDGMENT

Thanks to the Faculty of Fisheries and Marine Sciences, Airlangga University, for supporting laboratory facilities and research parameter measurement equipment. Thanks to the entire research team, both laboratory technicians and research assistants, both in the laboratory of the Faculty of Fisheries and Marine Sciences and in the field (Bomo fishponds, Banyuwangi), so that this research could run smoothly. Thanks to colleagues in the Aquaculture department who supported the successful writing of this article.

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