Utilization Of Air Pollution As An Alternative For Growing Galah Shrimp (*Macrobracium Rosenbergii*) In The Minapadi System Hydroganic

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Abstract.

This research aims to increase farmers' income with high rice productivity and increase shrimp production. The method used was a Completely Randomized Design (CRD) experiment with 3 treatments and 4 replications. The treatments are: P1 (air pollution made from jengkol), P2 (air pollution made from noni), and P3 (air pollution made from garlic). This research was carried out for 100 days in the Teuku Umar University campus area using budikdamber aquaponics. The parameters observed were shrimp growth and survival. The research results showed that the best treatment was P2 which produced an average growth value for giant prawns of 3.42 g/ fish. From the results of this research, the application of air pollution with giant prawns has a positive impact on the observed parameters (P <0.05) *and provides benefits for farmers.*

Keywords: *Macrobracium rosenbergii; air pollution and performance.*

I. INTRODUCTION

Giant prawns (*Macrobrachium rosenbergii*) is one type crustaceans which has great potential for development. This giant prawn has a high selling value because of its very large body size and the taste of its meat is similar to lobster. The relatively high selling price makes giant prawns very popular. Market opportunities for giant prawns are still wide open both at home and abroad. However, in reality, the level of implementation in the field still finds many obstacles so that it is not in line with our expectations. Increasing productivity can be done by overcome several obstacles that often occur which are caused by several factors, one of which is the cultivation method [1].One method of cultivation to increase the profits of giant prawn farmers is by intensifying the cultivation of giant prawns using minapadi.

Minapadi is a system for raising fish or shrimp in rice fields together with rice cultivation, for nursery or fish ready for consumption. This system has several advantages, including increasing farmers' income, increasing rice plant reproduction, increasing land efficiency and productivity, more controlled growth of rice and shrimp and meeting the growth of animal protein [2].An obstacle that often arises in the minapadi system of giant prawn cultivation activities which can reduce minapadi productivity in both shrimp and rice are pests, one of which is bird pests. According to [3] some very natural ingredients to automatically repel birds are jengkol, garlic and bantaro fruit. This material has a strong aroma which can cause air pollution. Therefore, researchers are interested in conducting research on "Utilization of Air Pollution as an Alternative for Growing Giant Prawns (Macrobrachium rosenbergii) in the Hydroganic Minapadi System".

II. METHODS

The method used in this research is the experimental method and the design used is a Completely Randomized Design (CRD) which consists of 3 treatments with 4 replications each. The treatment of each material used in this research includes:

P1 = jengkol-based air pollution
P2 = noni-based air pollution
P3 = garlic-based air pollution

This treatment has been tested on rice plants to repel birds. However, it has not been tested on the Minapadi system .This research was conducted in the Hatchery area of the Faculty of Fisheries and Marine Sciences in the form of budikdamber aquaponics. The container used is in the form of a bucket and is fenced around in the form of a cage, each plot consists of 4 buckets, each plot has one treatment. The treatment is air pollution that comes from natural ingredients. These ingredients include jengkol, bintaro fruit and garlic then extracted. After being extracted, the material is put into a bucket that has been modified using an automatic sprayer. The liquid that is added is first filtered using a tea strainer. Set the time for 60 minutes from morning to evening and place it in the middle of the cultivation bucket. The test prawns used were giant prawns with a body length of 3 – 5 cm and a weight of 1.15 – 2.20 gr. Giant prawn seeds were obtained from the waters of Aceh Tamiang. The distribution of giant prawn seeds is carried out one week after preparing the cultivation tanks. Before being put into the rearing tank, the body weight and body length of the giant prawn seeds are measured first, then stocking is carried out. The seed stocking density used is 50 seeds per cultivation container.

The giant prawn seeds that are stocked will be adapted to the environmental conditions of the rearing media by means of acclimatization during stocking to minimize stress levels. Each shrimp rearing container is equippedshelterswhich is made from coconut leaves [4]. During maintenance, giant prawns are given pelleted food according to body weight. The frequency of feeding is 3 times a day, namely morning, afternoon and evening. The amount of feed given is determined every 7 days, biomass is calculated by weighing the entire population of giant prawns. The maintenance of these giant prawn fry lasts for 100 days. Sampling is carried out every 7 days by taking all the test prawns, in order to determine weight gain, survival of giant prawns and water quality. To determine the quality of the water in the research container, water quality parameters were measured. In this case, the water quality parameters measured are DO, temperature and pH, which are water quality parameters that are suitable to be measured for keeping giant prawns. Water quality measurements were carried out at the beginning, middle and end of the study. Harvesting is carried out after 100 days of maintenance. The harvesting method is done by sliding all the seeds using a serger and then weighing them, measuring their length and calculating the final population of giant prawn fry as final data. Feeding 3 times a day, namely morning, afternoon and evening. The maximum dose given is 3% of the total biomass with the frequency of administration. Shrimp harvesting is carried out 90 days after planting rice. Observation of rice is seen from its productivity. Meanwhile, shrimp are seen from their growth and survival

According to [5], the absolute weight growth of fish is calculated using the following formula:

$$\boldsymbol{W = W_t - W_0}$$

Information :

W : Absolute weight growth (g)

Wt : Final maintenance weight (g)

W0 : Initial maintenance weight (g)

Based on survival rate calculations referring to [6]:

$$\boldsymbol{SR = \frac{N_t}{N_0}\, x\, 100\%}$$

Information :

SR : Survival rate (%)

Nt : Number of lives at the end of the experiment (tails) :

N0 : Number of lives at the beginning of the experiment (tails)

The data obtained will be grouped, tabulated, and ANOVA and SPSS statistical tests will be carried out to see the effect of the experiment. If there is a significant difference, a further Tukey test will be carried out.

III. RESULTS AND DISCUSSION

Growth of Giant Prawns

The growth results of giant prawns in each treatment are presented in Figure 1.

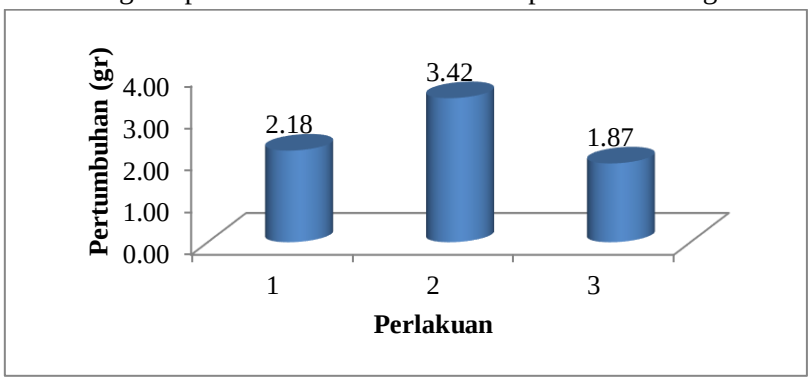

Fig 1. Growth of giant prawns

Growth is a combination of behavioral processes and physiological processes. Physiological processes are the process of utilizing the food consumed, while behavior is the way of consuming food. The amount of food consumed by giant prawns is influenced by species, age, size, food availability, nutritional value, and environmental conditions [7]. The research results based on Figure 1 show that the lowest growth value in this study was the P3 treatment with a value of 1.87 gr. Meanwhile, the highest growth value was found in treatment P2 with a value of 3.42 gr. The results of this study indicate that noni-based air pollution plays a role in supporting the growth of giant prawns. Several aspects of physiological processes related to individual growth include regeneration, metamorphosis and moulting. Moulting is a process of periodically removing old shells and forming new shells of a larger size. In crustaceans, growth occurs periodically after molting. Body weight gain will be hampered if it is not preceded by a skin molting process [8]. High growth is characterized by a faster molting process. The process of transferring energy from the hemolymph to the shrimp shell requires a large amount of energy. This large energy requirement is obtained from the feed consumed. Feeding is an energy requirement to support faster growth. This is closely related to growth, where if feed consumption is high, there is a lot of energy available that can be used for various life needs and by reducing energy expenditure, the portion of energy available for growth becomes larger. If the shrimp's physiology runs well, including metabolism, then feed utilization is more efficient and ultimately growth can increase [9]. Therefore, air pollution made from noni in treatment P2 is very suitable for growth

Survival of the Giant Prawn

The survival results of giant prawns show that the highest value found in P2 90%, followed by P1 86%, followed by P0 84%. The results of survival calculations are presented in Figure 2.

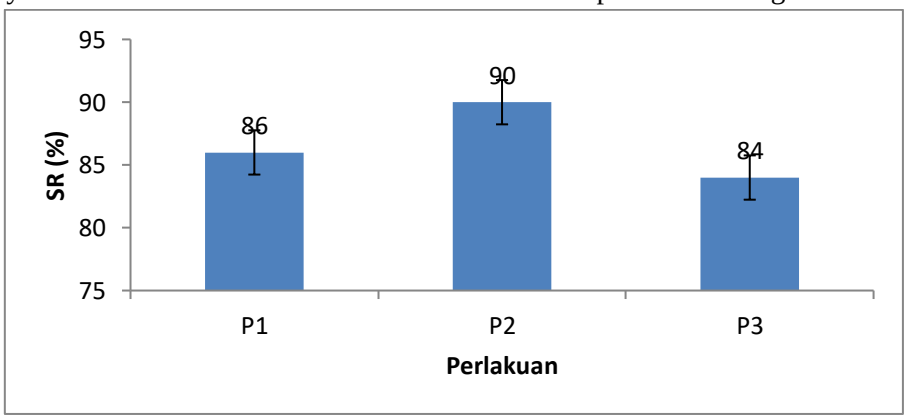

Fig 2. Survival of Giant Prawns

As follows Survival is the opportunity or chance of life of fish being kept at a certain time or time [10].Survival can be used as a benchmark to determine the tolerance and ability of some cultivated organisms to survive [11]. The ANOVA test results showed that different differences in air pollution had no significant effect on shrimp growth and survival.According to [3] some very natural ingredients to

automatically repel birds are jengkol, bintaro fruit and garlic. This is because these materials have a very strong aroma so they can cause air pollution. According to Mulyani [12]) states that the survival rate of an organism is more than 50% is classified as good, if the survival rate is 30 - 50% it is classified as moderate and if it is less than 30% then the survival rate is classified as not good. According to [13] which states that feed plays an important role that needs to be considered to improve the survival and growth of shrimp for the better, where feed is food as a source of energy and material. Providing shelter in each container during the cultivation of giant prawns is thought to minimize the level of cannibalism. According to Waluyoet al. [14], the use of shelters can provide a good place for shrimp to take shelter during molting.

IV. CONCLUSION

Air pollution made from noni has an effect on the growth of giant prawns with a growth value of 3.42 g/head.

V. ACKNOWLEDGMENTS

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REFERENCES

[1] Mahendra., Diana, F., Islama, D and Febrina, C.D. 2021. Growth Giant Prawns (Macrobracium Rosenbergii) With Different Stock Densities On The Minapadi System. ***International Journal of Science, Technology & Management.*** 5 (2) : 1560 – 1565

[2] Diana,F and Mahendra.2021.Different Combinations Of Legowo And Endemic Fish On Rice And Fish Productivity In Minapadi System.***International Journal of Science,Technology & Management***.2:1505- 1511

[3] Hardiansyah, M.Y. 2020. Pengusir Hama Burung Pemakan Padi Otomatis Dalam Menunjang Stabilitas Pangan Nasional. ***Jurnal ABDI.*** 2 (1): 85-103

[4] Mahendra. 2015. Kombinasi Kadar Kalium dan Salinitas Media pada Performance Juvenil Udang Galah (*Macrobrachium rosenbergii* De Man). ***Jurnal Perikanan Tropis***. 2 (1) : 55-71

[5] Rahman, Z., Mamun, A., Ahmad, I., and Rashid I. 2019. Influence of Probiotics on the Growth Performance of Sex Reversed Nile Tilapia (*Oreochromis niloticus*, Linnaeus, 1758) Fry**.** ***Journal of Aquaculture Research & Development.*** 10 (2) : 1-7

[6] Thu, E.V.T., Rahman, M., Phoo, W.W., and Kim C.H. 2019. Salinity Effects on Growth and Survival of the Polychaete Rockworm *Marphysa sanguinea* (Montagu, 1813) Juveniles and Adults. ***Journal of Aquaculture Research & Development.*** 10(2): 1-7.

[7] Mahendra dan Rizal M. 2019. The Growth and Efficiency of Galah Shrimp Feed (*Macrobrachium rosenbergii* De Man) with the Addition of Caffeine in Commercial Feed. ***Budapest International Research in East Sciences Journal***. 1 (4) : 112-120

[8] Affandi, R. dan Tang, U.M.. 2002. Fisiologi Hewan Air. Universitas Riau, Riau.

[9] Zaidy, A.B. 2007. Pendayagunaan Kalsium Media Perairan dalam Proses Ganti Kulit dan Konsekuensinyabagi Pertumbuhan Udang Galah (*Macrobrachium rosenbergii* de Man). *Disertasi*. Institut Pertanian Bogor, Bogor

[10] Mulqan, M., Rahimi, S.A.E., dan Dewiyanti I. 2017. Pertumbuhan dan Kelangsungan Hidup Benih Ikan Nila (*Oreochromis niloticus*) pada Sistem Akuaponik dengan Tanaman yang Berbeda. ***Jurnal Ilmiah Mahasiswa Kelautan dan Perikanan Unsyiah***. 2 (1) : 183-193

[11] Irianti, D.S.A., Yustiati, A., dan Hamdani H. 2016. Kelangsungan Hidup dan Pertumbuhan Udang Galah yang Diberi Kentang pada Media Pemeliharaan. ***Jurnal Perikanan Kelautan***.7(1) : 23-29

[12] Muliyani, Y.S, Yuliasman, dan Fitriana. 2014. Pertumbuhan dan Efisiensi Pakan Ikan Nila (*Oreochromis niloticus*) yang Dipuasakan Secara Periodik. ***Jurnal Akuakultur Rawa Indonesia***. 2 (1) : 1-12

[13] Taqwa, F.H., Djokosetyanto, D dan Affandi R. 2011. Waktu Penggantian Pakan Alami oleh Pakan Buatan terhadap Pertumbuhan dan Kelangsungan Hidup Postlarva Udang Vaname (*Litopanaeus vannamei*) Selama Pemeliharaan di Media Bersalinitas Rendah. ***Jurnal Akuakultur Indonesia***. 10 (1) : 38-43

[14] Waluyo, A., Mulyana dan Ali, F. 2018. Tingkat Kelangsungan Hidup dan Pertumbuhan Udang Galah (*Marobrachium rosenbergii* De Man) Pada Media Bersalinitas. ***Jurnal Mina Sains***. 4 (2) : 107-126.