Fisheries Journal, 14 (4), 2330-2336 (2024)
http://doi.org/10.29303/jp.v14i4.932

ALTERNATIVE FEED OF SEAWEED FLOUR Caulerpa racemose ON THE GROWTH OF VANAME SHRIMP SEEDS (Litopenaeus vannamei)

Pakan Alternatif Tepung Rumput Laut Caulerpa racemose Terhadap Pertumbuhan Benih Udang Vaname (Litopenaeus vannamei)

Dewi Yuniati[1*], Muh. Fadli[1], Darsiani[1], Zulfiani[1], Nurfadillah[1], Shobrina[2]

[1]Aquaculture Study Program, Faculty of Animal Husbandry and Fisheries, University of West Sulawesi, [2]Aquaculture Study Program, Faculty of Agriculture, Tidar University

Prof. Dr. Baharuddin Lopa, S.H Road, Talumung, Majene Regency, West Sulawesi 91412

*Corresponding Author: dewi.yuniati@unsulbar.ac.id

(Received October 25th 2024; Accepted December 27th 2024)

ABSTRACT

This study aims to determine the effect of seaweed meal *Caulerpa racemose* on the growth and survival rate of vaname shrimp (*Litopenaeus vannamei*) fry. The shrimp reared for 30 days at Balai Benih Ikan Pantai (BBIP) Poniang. This study used a Complete Randomized Design with 4 treatments and 3 replication. The dose of seaweed added to the feed is 0% in treatment A or control, 5% in treatment B, 15% in treatment C and 25% in treatment D. The density of the shrimp was 3 fishes/L. The shrimp feed 3 times daily at 07.00, 14.00, and 21.00 WITA with feeding rate of 5% of body weight. Data analysis was performed using SPSS 22.00 software. The parameters tested included absolute weight growth, specific growth rate, and survival rate. The results showed that the utilization of seaweed meal had no real effect ($p>0.05$) on absolute weight growth, specific growth rate, and survival rate in vaname shrimp fry.

Key words: growth, seaweed, survival rate, vaname shrimp

ABSTRAK

Penelitian ini bertujuan untuk mengetahui pengaruh tepung rumput laut *Caulerpa racemose* terhadap pertumbuhan dan sintasan benih udang vaname (*Litopenaeus vannamei*). Pemeliharaan dilakukan selama 30 hari di Balai Benih Ikan Pantai (BBIP) Poniang. Penelitian ini menggunakan Rancangan Acak Lengkap dengan 4 perlakuan dan 3 ulangan. Dosis rumput laut yang ditambahkan pada pakan yaitu 0% pada perlakuan A atau kontrol, 5% pada perlakuan B, 15% pada perlakuan C dan 25% pada perlakuan D. Padat penebaran benih udang vaname sebanyak 3 ekor/L. Frekuensi pemberian pakan yaitu 3 kali sehari pada pukul 07.00, pukul 14.00, dan pukul 21.00 WITA sebanyak 5% dari bobot tubuh. Analisis data dilakukan menggunakan software SPSS 22.00. Parameter yang diuji meliputi pertumbuhan berat mutlak, laju pertumbuhan harian, sintasan dan retensi protein. Hasil penelitian menunjukkan bahwa penggunaan tepung rumput laut tidak berpengaruh nyata ($p>0,05$) terhadap pertumbuhan bobot mutlak, laju pertumbuhan harian, dan sintasan pada benih udang vaname.

Kata Kunci: Pertumbuhan, Rumput Laut, Udang Vaname, Sintasan

INTRODUCTION

Whiteleg shrimp (*Litopenaeus vannamei*) has high economic value, even the demand is quite high nationally and for export (Nurhasanah *et al*., 2021). Since 2015, production has continued to increase. In 2019, production in Indonesia reached 1.05 million tons (KKP, 2020). Support for increasing whiteleg shrimp production is very important, such as the availability of quality feed. In whiteleg shrimp cultivation, appropriate feed is needed for optimal growth (Ulumiah *et al.*, 2020). To achieve the desired growth, of course, the nutrient content of the feed needs to be considered. According to WWF Indonesia (2024), the minimum protein content for whiteleg shrimp is at least 30%. Potential ingredients that can be used as whiteleg shrimp feed are Caulerpa racemose seaweed flour or known as sea grapes. Its nutrient content includes protein, fat, fiber and vitamin C (Handayani, 2006). The use of sea grape flour as feed for fish has been carried out on several commodities, including milkfish, tiger prawns, and tilapia. The addition of sea grape flour has been proven to have a positive effect on the growth of milkfish and tiger prawns (Darmawati, 2020; Rahmawati, 2017).

The addition of sea grapes also has a positive impact on increasing weight and length, growth, survival rate, and feed efficiency (Zulfikar, 2019). Another study by Putra *et al*., (2021), showed an increase that the provision of *Caulerpa racemosa* seaweed flour was able to increase the growth and survival of milkfish. The use of sea grape flour has been shown to increase growth in several cultivated commodities, on the other hand, research related to the use of *Caulerpa racemose* seaweed flour on whiteleg shrimp is still limited. This study aims to determine the effect of adding Caulerpa racemosa seaweed flour to feed in increasing the growth and survival of whiteleg shrimp seeds.

RESEARCH METHODS

Time and Place

This research was conducted for 30 days in November - December 2023 at the Poniang Coastal Fish Seed Center (BBIP), Majene Regency, West Sulawesi Province.

Experimental Design

This research is an experimental research using a Completely Randomized Design (CRD) with 4 treatments and 3 replications. The treatments used in this study were:

Treatment A: 100% artificial feed (control)
Treatment B: 95% artificial feed - 5% Caulerpa racemose
Treatment C: 85% artificial feed - 15% Caulerpa racemose
Treatment D: 75% artificial feed - 25% Caulerpa racemose

Maintenance

The preparation of test feed was carried out by mixing seaweed flour with commercial feed according to the specified dosage. Mixing was done by putting commercial feed and seaweed flour into a container, then adding enough water, then mixing until homogeneous.

The shrimp seeds used were PL 11 seeds from Barru Regency, South Sulawesi. Maintenance was carried out for 30 days using a jar with a volume of 10 L. The stocking density used was 3 tails/L. The frequency of feeding was 3 times a day at 07.00 am, 02.00 pm, and 09.00 pm as much as 5% of its biomass. Water quality was measured periodically, including salinity using a refractometer, dissolved oxygen using a DO Meter, temperature and pH using a pH meter. The parameters observed included absolute weight growth, daily growth rate, and survival.

Absolute Weight Growth

Absolute weight growth is calculated using the Effendie formula, (1977) as follows:

$$\mathbf{W = Wt - Wo}$$

Information:

W : Absolute weight growth (g)
Wt : Final average weight (g)
Wo : Initial average weight (g)

Daily Growth Rate

Daily growth rate is calculated using the following formula (Zonneveld *et al*., 1991):

$$\mathbf{DGR = \frac{LnWt - LnWo}{t} \times 100}$$

Information:

DGR : Daily Growth Rate (%/day)
Wt : Final average weight (g)
Wo : Initial average weight (g)
t : Maintenance Time (days)

Survival

The calculation of vaname shrimp survival is carried out using the following formula (Hidayat et al., 2013):

$$\mathbf{SR\ (\%) = \frac{Nt}{No} \times 100}$$

Description: SR: Survival Rate or survival rate (%)
Nt: Initial number of fish (tails)
No: Final number of fish (tails)

RESULT

Absolute Weight Growth

Figure 1 below shows the absolute weight growth of whiteleg shrimp (*Litopenaeus vannamei*) fed with seaweed flour.

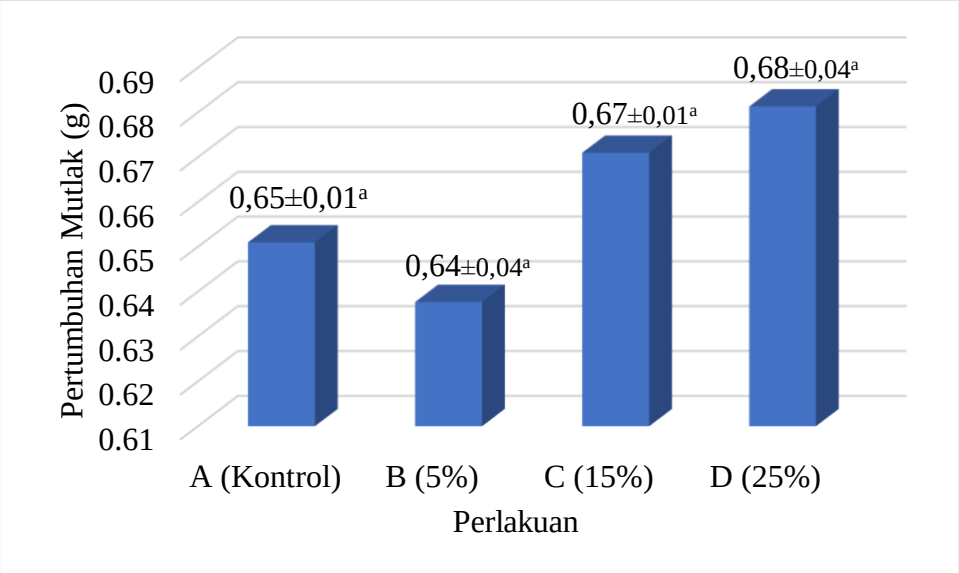

Figure 1. Absolute Growth of Vaname Shrimp

The results of the study showed that the provision of *Caulerpa racemosa* seaweed flour as an alternative feed had no significant effect (p>0.05) on the absolute growth of whiteleg shrimp. The absolute weight growth of whiteleg shrimp produced ranged from 0.638 g - 0.681 g.

Daily Growth Rate

The daily growth rate of whiteleg shrimp (*Litopenaeus vannamei*) seeds fed with seaweed flour is presented in Figure 2.

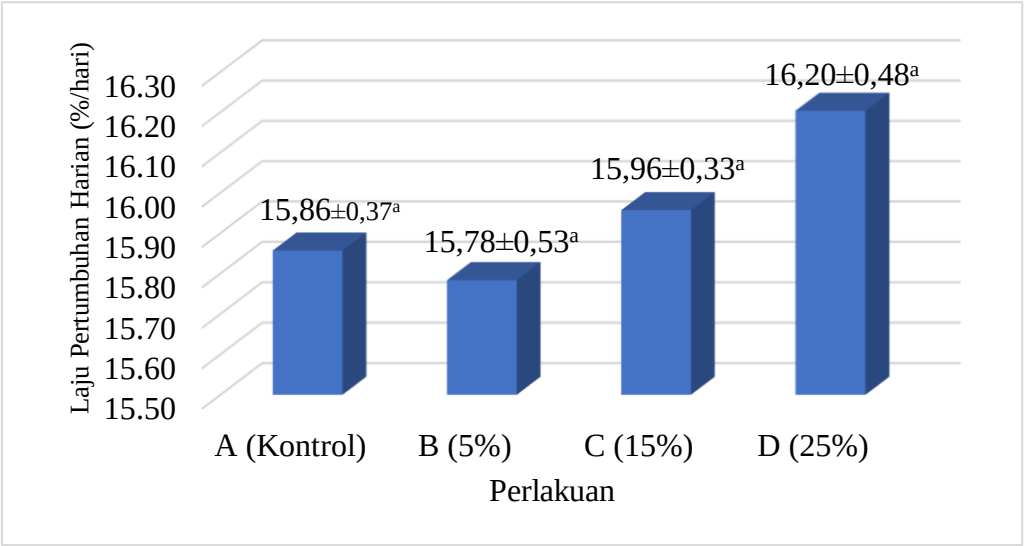

Figure 2. Absolute Daily Growth Rate of Whiteleg Shrimp

The results showed that the use of seaweed flour did not have a significant effect (P>0.05) on the daily growth rate. The daily growth rate of whiteleg shrimp ranged from 15.78%/day – 16.20%/day.

Survival

The survival rate of whiteleg shrimp (Litopenaeus vannamei) seeds fed with seaweed flour is presented in Figure 3.

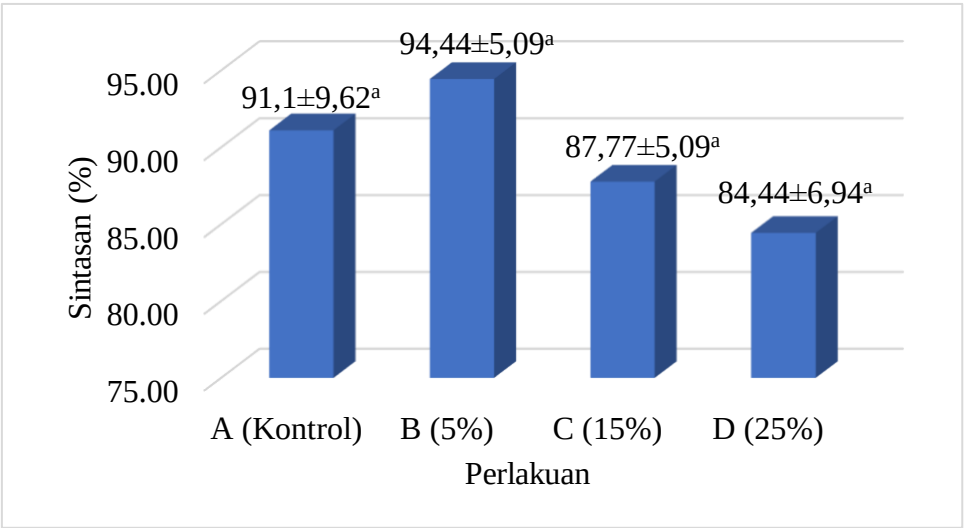

Figure 3. Absolute Daily Growth Rate of Vaname Shrimp

The results showed that the use of seaweed flour did not have a significant effect (P>0.05) on the survival of vaname shrimp. The survival rate of vaname shrimp ranged from 84.44% -91.11%.

Ya usah

DISCUSSION

Pertumbuhan Berat Mutlak

The provision of *Caulerpa racemose* seaweed flour was not significantly different (P <0.05). Mathematically, the absolute weight growth of whiteleg shrimp showed a change from the beginning to the end of maintenance. The provision of seaweed flour up to 25% showed that the protein content in *Caulerpa racemose* seaweed flour was used to increase the growth of whiteleg shrimp. The growth that was not different in the control treatment to the use of 25% seaweed flour showed that *Caulerpa racemose* seaweed flour could be used up to 25%. Fish growth can be achieved if its nutrient needs can be met (Darmawati *et al*., 2020). Furthermore, Putri *et al*. (2017) added that *Culerpa* sp. contains 27.66-29.42% protein, 5.13-5.8% fat, 12.43-14.11% ash, 6.32-7.03% crude fiber,

Whiteleg shrimp are carnivorous animals that require animal protein to increase optimal growth and development. According to Becker & Tacon (1994), whiteleg shrimp are also able to utilize carbohydrates in the metabolic process in an efficient manner. The ability of whiteleg shrimp to utilize carbohydrates occurs through the metabolic process, where shrimp can convert non-carbohydrate components, such as amino acids into glucose. Whiteleg shrimp can obtain energy from carbohydrates without having to consume carbohydrate sources. According to Kordi, (2010) that shrimp require quite high carbohydrates, ranging from 20-45%, but their utilization is different, depending on the source and type.

Daily Growth Rate

Daily growth rate can provide an overview of the ability of fish to convert feed nutrients into energy within a certain period of time. From the observation results of Figure 2, the daily growth rate of *Caulerpa racemosa* seaweed flour is the same as the control treatment. This shows that feed containing sea grape flour can be accepted by shrimp so that there is an increase in the daily growth rate of whiteleg shrimp. According to Widyantoko *et al.*, (2015) the growth rate of juvenile whiteleg shrimp and milkfish can be stimulated by the nutrient content of the raw materials used, such as seaweed and the protein content of the feed. Furthermore, Tasruddin & Erwin, (2015) added that the growth rate of aquatic animals is influenced by the digestibility of the feed given.

The growth rate of fish is also supported by the fiber content of the feed given. At the right dose of fiber, a better fish growth rate is obtained. At low and higher doses, it can interfere with fish metabolism, so that the growth rate is disrupted (Rahmania *et al*., 2023). Based on the nutrient content of *Caulerpa racemosa* seaweed measured in this study, namely its protein content, it can be used as a raw material for making feed.

Furthermore, it was reported by Kumar *et al*., (2011), that *Caulerpa racemosa* has the potential as a raw material for feed because it has various advantages including high nutrient content with a protein content of 12.88-30.03%, carbohydrates 27.20-48.10% and fat 0.30-2.64%. Caulerpa racemosa contains dominant minerals in the form of calcium 5.97% and magnesium 0.4-4.1%.

Survival

The high and low survival rates can be influenced by the water quality conditions of the maintenance media. Lisna & Insulistyowati (2015) also stated that water quality greatly affects the survival and growth of shrimp. In this study, the survival of vaname shrimp was not significantly different (P <0.05), which ranged from 84.44% - 91.11%. Similar results were

shown in the study by Darmawati *et al.*, (2020) which showed that survival was not significantly different in milkfish given seaweed flour

.

Water Quality

The results of water quality measurements show temperature values of 27.3-33 ^{o}C, pH values of 6.4-7.9, salinity values of 17.2-19.6, and DO values of 6.1-7.0. Based on these results, the measured water quality values are still in optimal conditions for the maintenance of vaname shrimp (Suprapto, 2005; Adiwijaya, 2003). Optimal water quality conditions are very important in cultivation, because they can affect the growth and survival of shrimp.

CONCLUSION

The addition of *Caulerpa racemose* seaweed flour to the feed showed no significant difference (P>0.05) in absolute growth, daily growth rate, and survival. *Caulerpa racemose* seaweed flour can be used for vaname shrimp up to 25%.

ACKNOWLEDGEMENTS

Thanks are due to all parties who have assisted in this research.

REFERENCES

Adiwijaya, D., Sapto, P., Sutikno, E., Sugeng., & Subiyanto. (2003). *Budidaya Udang Vaname (Penaeus vannamei) Sistem Tertutup yang Ramah Lingkungan*. Departemen Kelautan dan Perikanan. Dirjen Perikanan Budidaya. Balai Besar Pengembangan Budidaya Air Payau Jepara.

Becker, P. B., & Tacon, A. G. J. (1994). Dietary Carbohydrate Utilization in Curtured Penaeid Shrimp: A Review. *Reviews in Fisheries Science & Aquaculture*, *2*(4), 345-371.

Darmawati, E., Pramudya, B., Bahri, S., & Mardjan, S.S. (2020). Integrasi Metode Gravitasi dan Metode Perbandingan Eksponensial untuk Penentuan Pusat Distribusi Pangan di Kabupaten Halmahera Selatan. *Jurnal Keteknikan Pertanian*, *8*(2), 63-70.

Darmawati., Soadiq, S., & Nurfa. (2020). Penambahan Tepung Rumput Laut *Caulerpa* sp. dalam Pakan terhadap Pertumbuhan dan Sintasan Ikan Bandeng (*Chanos chanos)*. *Octopus: Jurnal Ilmu Perikanan*, *9*(2), 88-93.

Effendi, M. I. (1997). *Biologi Perikanan*. Yayasan Pustaka Nusatama, Yogyakarta. 163 halaman.

Handayani, T. (2006). Protein pada Rumput Laut. *Oseana*, *31*(4), 23-30.

Hidayat, D., Sasanti, A.D., & Yulisman. (2013). Kelangsungan Hidup, Pertumbuhan dan Efisiensi Pakan Ikan Gabus (*Channa striata*) yang Diberi Pakan Berbahan Baku Tepung Keong Mas (*Pomacea* sp). *Jurnal Akuakultur Rawa Indonesia*, *1*(2), 161-172.

Kementerian Kelautan dan Perikanan (KKP). (2020). *Data Statistik Produksi Ikan dan Udang*. Indonesia.

Kordi, M. G. H. K. (2010). *Budi Daya Udang Laut*. Lily Publisher, Yogyakarta.

Kordi, M. G. H. K. (2007). *Pemeliharaan Udang Vaname*. Penerbit Indah, Surabaya.

Kumar, M., Kumari, P., Trivedi, N., Shukla, M. K., Gupta, V., Reddy, C., & Jha, B. (2011). Minerals, Pufas and Antioxidant Properties of Some Tropical Seaweeds from Saurashtra Coast of India. *J. Appl. Phycol*, *2*(3), 797–810.

Lisna., & Insulistyowati. (2015). Potensi Mikroba Probiotik_Fm dalam Meningkatkan Kualitas Air Kolam dan Laju Pertumbuhan Benih Ikan Lele Dumbo (*Clarias gariepinus*). *Fakultas Peternakan. Universitas Jambi. Mendalo*. 8 hal.

Nurhasanah., Junaidi, M., & Azhar, F. (2021). Tingkat Kelangsungan Hidup dan Pertumbuhan Udang Vaname (*Litopanaeus vannamei*) pada Salinitas 0 Ppt dengan Metode Aklimatisasi Bertingkat Menggunakan Kalsium $CaCO_3$. *Jurnal Perikanan*, *11*(2), 167-177.

Putra, D. F., Abbas, M. A., Solin, N., & Othman, N. (2021). Effects of Dietary *caulerpa lentillifera* Supplementation on Growth Performance and Survival Rate of Milk Fish, *Chanos chanos* (Forsskål, 1775). *Elkawnie*, *7*(2), 395-407.

Putri., Nadisa, T., Jusadi, D., Setiawati, M., Sunryo, & Tridjoko, M. (2017). Potensi Penggunan Rumput Laut *Caulerpa lentilifera* sebagai Bahan Baku Pakan Ikan Nila (*Oreochromis nilaticus*). *Skripsi*. Institute Pertanian Bogor.

Rahmania, M., Susanti, N., Areva, D., Harini, G., & Kinarsih, K. W. (2023). Pelatihan Pengelolaan Hasil Perikanan Bagi Siswa-Siswi Jurusan Agribisnis Perikanan Air Tawar di SMK Negeri 10 Padang. *Warta Pengabdian Andalas*, *30*(4), 814-821.

Rahmawati, M. (2017). Penambahan Tepung Anggur Laut (*Caulerpa lentillifera*) dalam Pakan terhadap Pertumbuhan dan Kelangsungan Hidup Udang Windu (*Penaeus monodon*). *Skripsi*. Fakultas Kelautan dan Perikanan, Universitas Syiah Kuala.

Suprapto. (2005). *Petunjuk Teknis Budidaya Udang Vannamei* (*Litopenaeus vanammei*). CV Biotirta, Lampung.

Tasruddin., & Erwin. (2015). Penambahan Tepung Rumput Laut *Kappaphycus alvarezii* dalam Pakan Komersial terhadap Performan Ikan Nila (*Oreochromis Niloticus*). *Jurnal Perikanan dan Kelautan*, *5*(2), 41–48.

Ulumiah, M., Lamid, M., Soepranianondo, K., Al-arif, M. A., Alamsjah, M., & Soeharsono. (2020). Manajemen Pakan dan Analisis Usaha Budidaya Udang Vaname (*Litopenaeus vanamei*) pada Lokasi yang Berbeda di Kabupaten Bangkalan dan Kabupaten Sidoarjo. *Journal of Aquaculture and fish Health*, *9*(2), 95-103.

Widyantoko, W., Pinandoyo., & Herawati, V. E. (2015). Optimalisasi Penambahan Tepung Rumput Laut Coklat (*Sargassum* sp.) yang Berbeda dalam Pakan terhadap Pertumbuhan dan Kelulushidupan Juvenil Udang Windu (*Penaeus monodon*). J*ournal of Aquaculture Management and Technology*, *4*(2), 9-17.

WWF Indonesia. (2014). *Budidaya Udang Vannamei Tambak Semi Intensif*. Seri Panduan Perikanan Skala Kecil. WWF Indonesia.

Zonneveld, N. Z. A., Huisman, E. A., Bonn, J. H. (1991). *Prinsip-Prinsip Budidaya Ikan*. Jakarta (ID): Gramedia Pustaka Utama. 318p.