

PAPER NAME

2021.976-980.pdf

AUTHOR

aSNI_ Andi

WORD COUNT

2364 Words

CHARACTER COUNT

12501 Characters

PAGE COUNT

5 Pages

FILE SIZE

487.4KB

SUBMISSION DATE

May 19, 2023 11:18 AM GMT+7

REPORT DATE

May 19, 2023 11:18 AM GMT+7

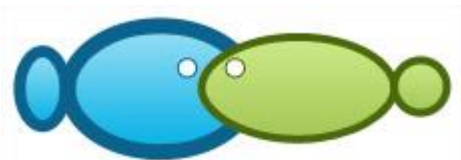
● 14% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

- 11% Publications database
- Crossref Posted Content database
- Crossref database
- 11% Submitted Works database

● Excluded from Similarity Report

- Internet database
- Quoted material
- Bibliographic material



Cultivation of seaweed using the basic stocking system in floating net cages on Salemo Island, Pangkep Regency, South Sulawesi, Indonesia

¹Abdul Rauf, ²Muhammad I. Wamnebo, ²Muhammad H. Fattah, ²Harlina Harlina, ³Andi Asni

¹ Department of Marine Sciences, Faculty of Fisheries and Marine Sciences, Muslim University of Indonesia; ² Department of Aquaculture, Faculty of Fisheries and Marine Sciences, Muslim University of Indonesia; ³ Department of Fisheries Resources Utilization, Faculty of Fisheries and Marine Sciences, Muslim University of Indonesia. Corresponding author: A. Rauf, arauf_umimksr@yahoo.com

Abstract. Seaweed has a large enough potential to be developed, especially in small islands. So far, cultivation activities carried out by seaweed farmers generally use stretch ropes so that they have high operational costs. One of the cultivation technology innovations that can be developed with an operational cost that is quite cheap and easy to operate is seaweed cultivation using floating net cages with a basic stocking system. The purpose of this study was to design a tool/media for seaweed cultivation in the form of marine cage with a bottom stocking system and to analyze the absolute growth rate based on the height of the cages (30, 50 and 70 cm). The method used in this study is the cultivation of seaweed with a bottom stocking system for different heights of the floating net cages (KJA). This study uses a comparative analysis approach of the results of seaweed production, based on different marine cage heights. The results showed that the highest seaweed production was at a depth of 50 cm, followed by 70 cm and the lowest was at a depth of 30 cm. The results of this study are expected to contribute to an increased production and income for seaweed farmers, especially in Pangkep Regency.

Key Words: marine cage, bottom stocking system, absolute growth rate, seaweed production.

Introduction. Pangkep Regency is one of the districts in South Sulawesi Province which has a coastal area with a coastline of about 49.71 km and has a total of 145 islands (Rauf et al 2019) with various coastal geomorphological variations, ranging from hilly areas to sloping beaches. Salemo Island is one of the islands located in Liukang Tupabbiring District, the north of which having the sufficient marine resources with development potential, such as the seaweed cultivation. One type of seaweed that is commonly cultivated by people in this area is *Euचेuma cottonii* (*Kappaphycus alvarezii*) (Anggadiredja et al 2006). This species is widely cultivated because the production technology is relatively cheap and easy, and the post-harvest handling is relatively simple (Meiyana et al 2001). Besides that, the seeds are also available in sufficient quantities (Dahuri 2001; Dahuri 2003). Apart from being an industrial raw material, this type of seaweed can also be processed into food (Restiana & Diana 2009; Ghufuran 2010; Sulisetijono 2009) which can be consumed directly.

Seaweed cultivation in Pangkep Regency has encountered many obstacles, which have resulted in reduced yields. Constraints commonly experienced by cultivators in this area include the lack of understanding concerning the correct cultivation techniques and the product quality maintenance, but the dominant issue remains the price, which is determined by the buyer or collector. In addition, the handling of seaweed pests is not appropriate. These can spread and attack the entire production area, which is already vulnerable to ice-ice disease, weather changes or decreases in the quality of the cultivation environment (Effendi 2003), but also conditioned by the quality of human resources. One of the most important factors is the right cultivation method, depending

on the spatial efficiency and the protection against from the pests, the predators (such as baronang fish) and the waves and currents (Hutabarat & Evans 2008; Syamsiah 2007; Wijayanto et al 2011). One of the best seaweed cultivation methods is to use floating net cages (KJA) media. The study refers to the marine cages cultivation media using the off-bottom method, as a modification of the *E. cottonii* seaweed cultivation recommendations of the Directorate General of Fisheries, including the off-bottom, floating (raft) and long line methods (Directorate General of Aquaculture 2005).

The present study aimed to design a tool/media for cultivating seaweed in the form of a marine cage with a basic stocking system and to analyze the seaweed absolute growth rate, based on the cage depth (30, 50 and 70 cm). The results of this study are expected to provide information on the development of *E. cottonii* seaweed cultivation in Salemo Island waters, Pangkep Regency.

Material and Method. The method used in this research is the seaweed cultivation method, with the basic stocking system. The research was carried out around Salemo Island in July 2019 (Figure 1).

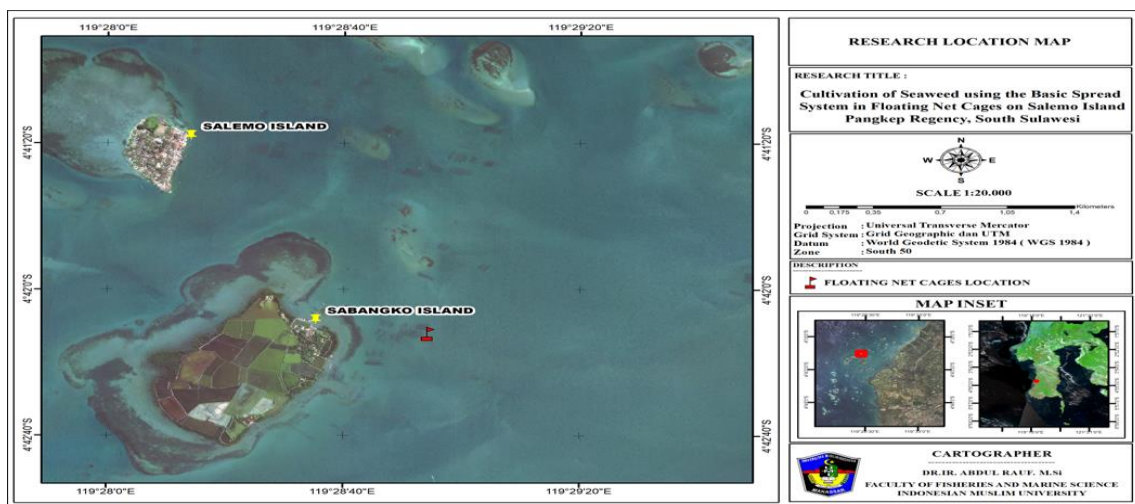


Figure 1. Map of the research location.

The present research was conducted according to the stages described in the bellow diagram (Figure 2).

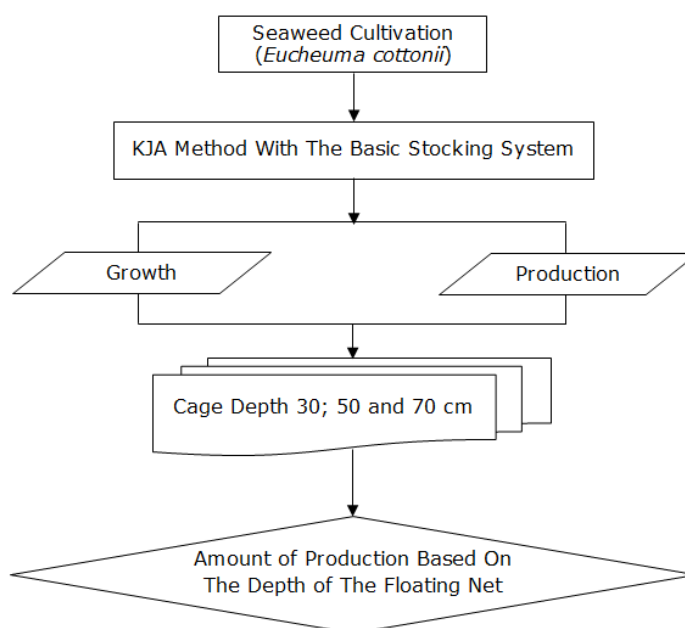


Figure 2. Flowchart of the research on *Eucheuma cottonii* cultivation on Salemo Island.

Research procedure. The present research was conducted using the following procedure:

1. Designing tools/media for seaweed cultivation in the form of floating cages. The tools, made of stainless steel profiles measuring 2 x 2 x 2 cm, had a length of 3 m, a width of 3 m and a depth of 30, 50 and 70 cm, respectively. The finished cage frame was wrapped in trawl no. 12, using a float made from a 4" paralon pipe attached around the KJA. Furthermore, it was operated at sea using a stake (weight replacement) with a weighted rope, at a depth of 7-10 m.
2. Spreading the seaweed seeds in the floating net cages, after weighing the initial quantity of 50 kg, was carried out at harvest time, at 45 days.
3. Determining the seaweed production by calculating the initial weight and final weight values for each cage (treatment).

Data analysis

Absolute growth rate. The absolute growth rate was calculated using the formula Pongarrang et al (2013):

$$G = W_t - W_o$$

Where:

G - absolute growth (kg);

W_t - weight of seaweed seeds at the end of the study (kg);

W_o - weight of seaweed seeds at the beginning of the study (kg).

Seaweed production. The seaweed production was calculated based on the results of the final weighing (after being maintained for 45 days) in each cage. The effect of cage depth (30, 50 and 70 cm) on the seaweed production was calculated based on the amount of production obtained for each cage variant.

Results

Seaweed cultivation in KJA. Seaweed is generally harvested after the age of 40-45 days (Harun et al 2013), considering its high degree of porosity (Restiana et al 2009; Sulisetijono 2009), in accordance with the market demand. The results obtained from the three cage sizes after weighing can be seen in Table 1 and Figure 4.

Table 1

Measurement results of the average weight (kg) of *Eucheuma cottonii* kept in floating net cages for 45 days

X-Coordinates	Y-Coordinates	Measurement results (kg)		
		Beginning	End	Depth (cm)
119° 28' 56.018" E	04° 42' 11.470" S	50	249	30
119° 28' 56.087" E	04° 42' 11.745" S	50	316	50
119° 28' 55.916" E	04° 42' 11.736" S	50	273	70



Figure 4. *Eucheuma cottonii* production maintained in KJA (original).

Absolute growth rate. The weighing of the final quantity of *E. cottonii*, after being maintained for 45 days in floating net cages placed at different depths, namely 30, 50 and 70 cm, resulted in 249, 316 and 273 kg, respectively (Table 2).

Table 2

The measurement results of the average weight (kg) of *Eucheuma cottonii* reared in the marine cage for 45 days

X-Coordinates	Y-Coordinates	Measurement results (kg)			
		Beginning	End	Absolute growth	Depth (cm)
119° 28' 56.018" E	04° 42' 11.470" S	50	249	199	30
119° 28' 56.087" E	04° 42' 11.745" S	50	316	266	50
119° 28' 55.916" E	04° 42' 11.736" S	50	273	223	70

10 The results of the growth analysis showed that the best absolute growth rate occurred in floating net cages with a height of 50 cm and a yield of 266 kg, while the lowest was found in floating cages with a height of 30 cm and a yield of 199 kg.

Discussion

From Table 2 it can be seen that there was a difference of final weights between the three treatments, where the lowest *E. cottonii* production was found in cages with a height of 30 cm, presumably due to a higher temperature from the sunlight, compared to those with a height of 50 and 70 cm (Pongarrang et al 2013). Cages with a height of 50 cm had a higher production, presumably because the temperature decreased and was optimal, while in cages with a height of 70 cm, the production was lower than in the 50 cm variants, probably because the penetration of sunlight has started to decrease due to a high sedimentation (turbidity) at the research location. The very high light intensity actually inhibits the photosynthesis process (photoinhibition), while the too low intensity becomes a barrier for the photosynthetic process that occurs in seaweed (Sunarto 2008). Kune (2007) stated that an important factor affecting the growth rate of seaweed is that the difference in light intensity received by seaweed at different depths will affect the stretch of new cell walls which hardly changes when the expansion of seaweed growth is inhibited by light.

Conclusions. It was demonstrated by the experimental method of the present study that tools or media for cultivating *E. cottonii* with the KJA method and a basic stocking system are appropriate for use in seaweed cultivation. The best absolute growth rate and yields of *E. cottonii* in marine floating cages, with a maintenance time of 45 days, were observed in cages with a height of 50 cm, where as much as 266 kg were produced from an initial weight of 50 kg.

5 **Conflict of interest.** The authors declare no conflict of interest.

References

- Anggadiredja T. J., Zalnika A., Purwanto H., Istini S., 2006 Seaweed: Cultivation, management, and marketing of potential fisheries commodities. *Journal of Fisheries Science* 7(1):65-70.
- Dahuri R., Jacob R., Ginting S. P., Sitepu M. J., 2001 Integrated coastal and ocean resource management. Pradnya Paramita, Jakarta, Indonesia, 326 p.
- Dahuri R., 2003 [Marine biodiversity. Seaweed development. Indonesia's sustainable development asset]. PT Gramedia Pustaka Utama, Jakarta, Indonesia, 412 p. [In Indonesian].
- Effendi H., 2003 Study of water quality for aquatic environment biological resources processing. Canisius, Yogyakarta, Indonesia, 258 p.

- Ghufran M. H. K. K., 2010 A to Z cultivation of aquatic biota for food, cosmetics and medicine. Lily Publisher, Yogyakarta, Indonesia, 218 p.
- Hutabarat S., Evans S. M., 2008 Introduction to oceanography. University of Indonesia Press, Jakarta, Indonesia, 159 p.
- Harun M., Montolalu R. I., Suwetja K., 2013 Physical and chemical characteristics of carrageenan seaweed *Kappaphycus alvarezii* at different harvest ages in Tihengo Village, North Gorontalo District. Journal of Fishery Product Technology Media 1(1):67-70.
- Kune S., 2007 Growth of seaweed cultivated together with beronang fish. Journal of Agribusiness 3(1):34-42.
- Meiyana M., Evalawati, Prihaningrum A., 2001 Biology of seaweed. Marine Cultivation Center, Lampung, 66 p.
- Rauf A., Yusuf K., Asmidar, Kasnir M., Tajuddin M., 2019 Application of remote sensing technology and geographical information systems in monitoring the potential of coastal and marine resources in Pangkep Regency. Journal of Indonesian Tropical Fisheries 1(1):11-16.
- Restiana W. A., Diana R., 2009 Analysis of the nutritional composition of seaweed (*Eucheuma cottonii*) in Karimunjawa Island with different drying processes. MSc Thesis, Diponegoro University Cultivation Study Program, Semarang, Indonesia, 147 p.
- Sulisetijono, 2009 Algae leftover materials. UIN Press, Malang, pp. 133-134.
- Sunarto, 2008 The role of light in the production process at sea. IOP Conference Series, Faculty of Fisheries and Marine Science, Padjajaran University, Bandung, 17 p.
- Syamsiah, 2007 Study of physics-chemical oceanography of Tonyaman Waters, Polewali Mandar Regency, for the suitability of *Kappaphycus alvarezii* seaweed cultivation land. Essay, Hasanuddin University Faculty of Marine and Fisheries Sciences, Makassar, Indonesia, 23 p.
- Pongarrang D., Rahman A., Iba W., 2013 Effect of spacing and seed weight on growth of seaweed (*Kappaphycus alvarezii*) using the verticulture method. Journal of Mina Laut Indonesia 3(12):94-112.
- Wijayanto T., Hendri M., Aryawati R., 2011 Study on the growth of *Eucheuma cottonii* seaweed with different planting methods in Kalianda waters, South Lampung. Maspari Journal 3:51-57.
- *** Directorate General of Aquaculture, 2005 Profile of seaweed in Indonesia. Directorate of Cultivation of the Ministry of Marine Affairs and Fisheries, 192 p.

Received: 18 January 2021. Accepted: 26 March 2021. Published online: 11 April 2021.

Authors:

Abdul Rauf, Indonesian Muslim University, Faculty of Fisheries and Marine Sciences, Department of Marine Sciences, Jl. Urip Sumoharjo KM 5, 90231 Makassar, Indonesia, e-mail: arauf_umimksr@yahoo.com

Muhammad Ikhsan Wamnebo, Indonesian Muslim University, Faculty of Fisheries and Marine Sciences, Department of Aquaculture, Jl. Urip Sumoharjo KM 5, 90231 Makassar, Indonesia, e-mail: ikhsanwamnebo25@gmail.com

Muhammad Hattah Fattah, Indonesian Muslim University, Faculty of Fisheries and Marine Sciences, Department of Aquaculture, Jl. Urip Sumoharjo KM 5, 90231 Makassar, Indonesia, e-mail: muhhattah.fattah@umi.ac.id

Harlina Harlina, Indonesian Muslim University, Faculty of Fisheries and Marine Sciences, Department of Aquaculture, Jl. Urip Sumoharjo KM 5, 90231 Makassar, Indonesia, e-mail: harlina.harlina@umi.ac.id

Andi Asni, Indonesian Muslim University, Faculty of Fisheries and Marine Sciences, Department of Fisheries Resources Utilization, Jl. Urip Sumoharjo KM 5, 90231 Makassar, Indonesia, e-mail: andiasni26@gmail.com

This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

How to cite this article:

Rauf A., Wamnebo M. I., Fattah M. H., Harlina H., Asni A., 2021 Cultivation of seaweed using the basic stocking system in floating net cages on Salemo Island, Pangkep Regency, South Sulawesi, Indonesia. AACL Bioflux 14(2):976-980.

● **14% Overall Similarity**

Top sources found in the following databases:

- 11% Publications database
- Crossref database
- Crossref Posted Content database
- 11% Submitted Works database

TOP SOURCES

The sources with the highest number of matches within the submission. Overlapping sources will not be displayed.

1	Munawan, M Kasim, Ruslaini. "Growth rate of Eucheuma denticulatum ...	4%
	Crossref	
2	Universitas Brawijaya on 2021-04-06	2%
	Submitted works	
3	Universitas Airlangga on 2019-05-14	2%
	Submitted works	
4	Universitas Brawijaya on 2019-04-22	2%
	Submitted works	
5	Rutgers University, New Brunswick on 2022-02-23	<1%
	Submitted works	
6	D Rianjuanda, M A Chaliluddin, R Rinaldi, K Melanie, R M Aprilla. "The o...	<1%
	Crossref	
7	Lambung Mangkurat University on 2021-03-15	<1%
	Submitted works	
8	Mujiyanto, A R Syam, D Wijaya, S E Purnamaningtyas. "Suitability water...	<1%
	Crossref	
9	Syahrudin. " Optimization of extraction and quality assessment base...	<1%
	Crossref	

-
- 10 M Ulfah, L Anggraini, S Karina, S Agustina et al. " Evaluation of trophic ... <1%
Crossref
-
- 11 Marcelien Djablina Ratoe Oedjoe, Welem Linggi Turupadang, Alexande... <1%
Crossref posted content