Cultivation Of Eucheuma Cottoni In Various Planting Distance From The River Estuary

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Abstract: This study aimed to know the effect of various distances from the estuary of the river in the cultivation of seaweed Eucheuma cottoni on growth and production. The research was conducted using the method of research used experimental method to completely randomized design (CRD). The treatments were tested, namely cultivation of seaweed with a distance of 450 (station I) and 900 m from estuary of the river (station II) with initial weight of each bond seaweed of 200 g / Connective with a repeat 3 times. The data collected is data growth, production and water quality. Data were analyzed with descriptive analysis. The results showed the growth and production of seaweed Eucheuma cottoni that tested higher obtained in the treatment of 450 m from the estuary of the river compared with the treatment of 900 m from estuary of the river that is thought to be caused due to water quality and better suited to the needs of seaweed, especially salinity and phosphate

Keywords: seaweed, growth, production, water quality

I. INTRODUCTION

Seagrasses are one of the commodities that today's aquaculture while encouraged by the Indonesian government in order to increase foreign exchange. This commodity has even been designated as the primary commodity in the revitalization program of fisheries since 2005, so it takes cultivation quickly and appropriately to serve the demand of production in terms of quantity, quality and continuity by using a package simple technology that can be used by farmers (Joppy at al., 2015)[1]. Seaweed has been cultivated with the aim to satisfy increasing market demand (Soenardjo, 2011)[2]. Seaweed farming can be defined with sustainable seaweed farming activities that are environmentally friendly, in development consider the characteristics and environmental carrying capacity (Insan et al,. 2013)[3]. The success of seaweed cultivation is influenced by several environmental factors of physical, chemical and biological. In addition, the selection of the location and the method to be used also determines the success. Seaweed cultivation done calm waters. As is known the calm waters many are turning functions that are no longer suitable for the location of cultivation produces carrageenan is widely used in the chemical industry (Soenardjo, 2011)[2]. Selection of right location is an important factor in determining the feasibility of seaweed cultivation. The main factor of success of seaweed farming is selecting the right location. Among the environmental factors are the availability of light, temperature, salinity, currents and availability of nutrients (Lobban and Harrison, 1997)[4]. Furthermore, Akib (2015)[5] stated factors physics, chemistry and biology of the waters to be one determinant of the success of seaweed cultivation. This study aimed to know the effect of various distances from the estuary of the river in the cultivation of seaweed Eucheuma cottoni on growth and production.

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2. RESEARCH METHODS

The research was conducted around the estuary Kalakkarayya of village Sapolohe, District of Bontobahari of Bulukumba Regency from April to June 2015. The method used was experimental method completely randomized design. The treatments were tested, namely cultivation of seaweed with a distance of 450 (station I) and 900 m from estuary of the river (station II) with initial weight of each bond seaweed of 200 g/Connective with a repeat 3 times. The method of research is the primary data collection is done by direct measurement of the growth, production and physical and chemical parameters in the field. Water quality analysis conducted in the Laboratory of Water Quality Agricultural Polytechnic State Pangkep Monitoring of water quality consists of salinity, pH, dissolved oxygen and phosphate. Phase cultivation of carried out on young thallus and ramifications good, then the seeds of E. cottonii weighed with initial weight of 200 g /Connective for all treatments. Thallus seaweed is cultivated for 4 weeks (30 days) after planting. To determine the daily growth rate of E. cottonii is done by weighing the wet weight every week. Measurement of environmental parameters is done at the time of weighing seeds. Data daily growth rate can be determined by using the formula of foog (1975) in Atmadja et al (1996)[6] :

$$DGR = [(Ln\ Wt – Ln\ Wo) / t] \times 100\ \%$$

Where: DGR: Daily Growth Rate (%), Wt : Weight t test plants at the time of observation (g).

The production data is calculated by weighing the total weight of the seaweed at the end of the study (g). Furthermore, the data obtained were analyzed with descriptive analysis.

3. RESULTS AND DISCUSSION

Growth

E. cottonii daily growth rate during the study (Table 1) shows that the highest growth rate was obtained in the treatment of 450 m from the estuary of the river compared with the treatment of 900 m from the mouth of the river starting from the first week to week IV. In the first week almost the same growth rate of 241.7 at a distance of 450 m from the estuary and 240.33 at a distance of 900 m from estuary of the river (8.3%). This is thought to be caused by the seaweed is still in the process of adaptation, and in accordance with the opinion of Susanto (2003)[7]. Furthermore, at the end of the study the

highest growth rate was obtained at the first station (450 m) with an average of 466.67 g, whereas at station II amounted to only 411.7 g.

Table 1. *Results of Measurement Growth During Research (g)*

Distance from the estuary of the river (m)	Description	Measurement period (weeks)				
		1	2	3	4	5
450	Measurement results (g)	200,00	241,70	400,33	421,33	466,67
900		200,00	240,33	306,67	351,33	411,70

Source: *Primary Data After processed, 2015*

Production

Production was expected outcomes in an aquaculture and seaweed production calculation results Eucheuma cottoni during the study are shown in Table 2.

Table 2. *Calculation Results During the Research (g)*

Description	Distance from the estuary (m)	
	450	900
The average production (g)	591	505
Max (g)	635	552
Min (g)	561	465

Source: *Primary Data After processed, 2015*

The results showed that the average production of seaweed Eucheuma cottoni cultivated at a distance of 450 m from the river mouth showed higher production compared with a distance of 900 m from estuary of the river are respectively 591 g and 505 g. Similarly, the production value of the maximum and minimum of two treatments, where the treatment of 450 m from estuary of the river have seaweed production maximum of 635 g and a minimum of 561 g, while at a distance of 900 m from estuary of the river only has production maximum of 552 g and minimum production is 465 g. The high production at a distance of 450 m from the treatment of the mouth of the river thought to be caused by the influence of water quality that is more supportive than the quality of the water at a distance of 900 m from estuary of the river.

Water quality

Growth and production of seaweed is also determined by the environment in which his life. Environmental factors such as salinity, pH, oxygen and nutrients correlated with the growth and production of seaweed. According Insan et al., (2013)[3] according to environmental factors that will produce maximum growth rate. Results of water quality measurements during the study as shown in Table 3.

Table 3. *Measurement Results Over Water Quality Research*

Period measurement	salinity (ppt)		pH		Dissolved Oxygen (ppm)		PO4 (ppm)	
(Weeks)	450 m	900 m	450 m	900 m	450 m	900 m	450 m	900 m
1	12	10	7,7	7,8	5,1	4,8	0,0034	0,0034
2	27	20	7,9	7,6	4,3	3,8	0,0016	0,0015
3	25	30	7,7	7,8	4,9	5,0	0,0090	0,0051
4	13	5	7,8	7,9	5,1	4,6	0,0002	0,0002
Average	19.25	16.25	7,77	7,77	4,85	4,55	0,00355	0,00255
Max	27	30	7.9	7,9	5,1	5,0	0,00900	0,00510
Min	12	5	7.7	7,6	4,3	3.8	0,00020	0,00020

Source: *Primary Data After processed, 2015*

Salinity

According to Anonymous (2005)[8], Euchema cottoni is a seaweed that is stenohaline. He is not resistant to high salinity fluctuations, salinity both ranged between 28-35 ppt, to obtain the condition of waters with salinity conditions should be avoided location adjacent to the mouth of the river as it can cause salinity fluctuations that interfere with the growth of seaweed. Based on the results of measurements at the station I show average salinity values during the study amounted to 19,25 ppt to 27 ppt for maximum value and minimum value of 12 ppt. Similarly, at the second station an average value of 16,25 ppt and salinity value of 30 ppt salinity maximum and minimum of 5 ppt. The salinity value is still low compared with the opinion of Kangkan (2006)[9] which states the desired salinity tolerance by seaweed Euceuma cottoni in the range of 36 to 37.7 ppt. Similarly, the results of research conducted by Akib et al., (2015)[5] to get the value of salinity ranges from 28 to 31.5 ppt with an average value of between 29.33 to 30.833 ppt.

pH

The value of the degree of acidity is highly correlated with the levels of carbon dioxide contained in the waters, seaweed requires that tend to be alkaline pH (Anonymous, 2005)[8]. The pH value in this study either at stations I and II stations have an average pH value of 7,7. The pH value is still in accordance with the results of research who found the value of the waters between 7 to 8 (Insan et al., 2013)[3]. Similarly, the opinion Sujatmiko and Tourists (2003)[10], which states pH waters are good for cultivation of E. cottonii ranging between 7-9 with the optimum range of 7,3 to 8,2. Furthermore, (Luning, 1990)[11] stating the condition of the acidity of the water has an important role in the growth of seaweed, because the pH value will be proportional to the organic carbon content in waters that are indispensable in the process of photosynthesis. The degree of acidity (pH) of seawater tends to be alkaline, it is because the CO_2 in the form of a carbonate or bicarbonate, bicarbonate release CO_2-free and seaweed used for photosynthesis.

Dissolved oxygen

The results showed that the dissolved oxygen values by an average of 4.85 ppm with a maximum value of 5.1 ppm and a minimum value of 4.3 ppm (station I). while the second station average dissolved oxygen of 4.55 ppm with a maximum value of oxygen at 5.0 and 3.8 ppm minimum. Dissolved oxygen values obtained in this study was lower than the results Joppy et al., (2015)[1] who found the results of an assessment of the dissolved oxygen in the range of 7.90 to 11.8 mg / L to the station I and 4.9 to 6.6 at station II, while the range of dissolved oxygen in the waters of the conformity assessment for the location seaweed cultivation should be more than 6 ppm. According to Effendi (2003)[12], dissolved oxygen fluctuates daily and seasonally, depending on mixing and movement of water future, photosynthetic activity, respiration and waste into water bodies. Differences in the pH value of the water due to differences in measurement time. The concentration changes the pH of the water to have a daily cycle. This cycle is a function of carbon dioxide, if the water contains free carbon dioxide and carbonate ions, the pH tends to acidic, and the pH will increase if CO_2 and HCO_3 began to decrease Phosphate (PO_4) The results showed that the phosphate content in the station I is greater than the station II. It is also thought to lead to higher growth and production of seaweed on the first station because it contains more phosphates. According to Effendi (2003)[13], most of the phosphate derived from inputs of organic matter through the land in the form of industrial and domestic waste (detergent). Added by Hutabarat (2000[13]) that the source of phosphate in the water also comes from the erosion of rock on the beach. Phosphate itself in waters act as a nutrient. But the high content of phosphate in the water may have an impact on plankton blasting (Akib et al., 2015)[5].

4. CONCLUSION

The results showed that the growth and production of seaweed Eucheuma cottoni higher obtained in the treatment of 450 m from the estuary of the river compared with the treatment of 900 m from estuary of the river that is thought to be caused due to water quality and better suited to the needs of seaweed, especially salinity and phosphate where the salinity in the treatment of 900 m from estuary of the river is more volatile and the content of phosphate in the treatment of 450 m from the river mouth is greater than the treatment of 900 m from the river mouth.

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