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The Relationship Between Ectoparasites and the Growth of Seaweed (Kappaphycus Alvarezii) Cultivated in the Waters of Mandalle Village, Pangkajene Islands Regency

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Abstract
This study aims to determine the types of ectoparasites found in the thallus of cultivated seaweed Kappaphycus alvarezii and their effect on their growth. The research will be conducted in the seaweed cultivation area of Mandalle Village, Pangkajene Islands Regency. The determination of research stations was carried out purposively (purposive sampling) for three representative aquaculture stations. This is so that it can represent or describe the condition of the waters of Mandalle Village. The cultivation method used in this study was the long line method as used by residents around the study site. Maintenance construction as a sampling unit at each station point, in the form of a 25-meter long rope span of 10 ropes with a distance between the ropes of 1 m. Each stretch rope contains 100-120 seedling clumps with a distance of 20 cm between the straps. Seaweed seeds with an initial weight of 50-70 grams, tied to clump ropes. Planting of seeds is carried out at a depth of 30 cm from the surface of the water. The cultivation construction distance is installed as far as 700-1000 m from the beach. Observation of growth is done by measuring the weight of each clump or the overall weight of each clump of each span rope, at the end of each maintenance cycle. The data obtained for 45 days is then calculated using the growth formula. Seaweed samples for observation of ectoparasites were taken at 3 (three) points of the cultivation area for each bundle of seaweed. The entire surface of the sample thallus was observed with the naked eye and the loop. The results of this study indicated that all observation stations on the South, North and West coasts were dominated by barnacle ectoparasites, followed by green mussels and worms with a total percentage of 90%. While the absolute growth between all stations is relatively the same.

Keywords: Inventory, Ectoparasites, Kappaphycus Alvarezii

Introduction

One of the obstacles in the successful production of seaweed cultivation so far is the sea grass disease, namely Ice-Ice. The coastal waters in Mandalle village have the potential to grow seaweed as evidenced by the many seaweed farmers who have been cultivating Kappaphycus alvarezii seaweed in this location for years. However, in recent years production has decreased, allegedly due to water quality, which does not guarantee increased growth. In addition, the increasing mud content at the bottom of the waters causes the alvarezi thallus to be covered with mud when it is cultivated (personal consultation with local farmers). The layer of mud that covers the surface of the thallus can cause Ice-ice disease in Kappapphucus alvarezii due to the layer of mud and the presence of ectoparasites attached to the surface of the thallus. This can inhibit growth and eventually cause death of the seaweed Kappaphycus alvarezii (Aslan, 1998).

This study aims to determine the types of ectoparasites found in the thallus of cultivated Kappaphycus alvarezii seaweed and their effect on their growth. This research is expected to be

able to inventory ectoparasites attached to the thallus of cultivated seaweed which can trigger Ice-ice disease so that it can affect the growth and production of K.alvarezii seaweed.

Research Method

Time and place

The research was carried out for 8 (eight) months, from April to December 2019, with 3 (three) cultivation production cycles, each 45 days each production cycle. The research will be conducted in the seaweed cultivation area of Mandalle Village, Kab. Pangkep. The determination of research stations was carried out purposively (purposive sampling) for 3 (three) aquaculture stations representing waters. This is so that it can represent or describe the condition of the waters of Mandalle Village. The coordinates of the stations are recorded with the help of the global positioning system (GPS).

Installation of cultivation construction

The cultivation method used in this study is the long line method as used by residents around the research location. The cultivation construction, which is a research unit, uses part of the farmer's property (share financing).

Maintenance construction as a sampling unit at each station point, in the form of a 25-meter long rope span of 10 ropes with a distance between the ropes of 1 m. Each stretch rope contains 100-120 seedling clumps with a distance of 20 cm between the straps. Seaweed seeds with an initial weight of 50-70 grams, tied to clump ropes. Planting of seeds is carried out at a depth of 30 cm from the surface of the water. The cultivation construction distance is installed 700-1000 m from the beach with the assumption that at the lowest tide, the seaweed is still in the water body. Furthermore, the seaweed was maintained for 45 days each cycle. Activities to clean seaweed from disturbing organisms are carried out as needed.

Observation of the growth of K. alvarezii seaweed

Observation of growth is done by measuring the weight of each clump or the overall weight of each clump of each span rope, at the end of each maintenance cycle. The data obtained for 45 days is then calculated using the growth formula. As additional supporting data, morphological observations of seaweed thallus were carried out according to vMeneses (1996) in the form of: color, branching, and Main Thallus Base (PTU), Middle Main Thallus (TTU), Main Thallus End (UTU), New Thallus Base (PTB) , and New Thallus End (UTB).

Observation of survival rate of K. alvarezii seaweed

Observation of the survival rate of seaweed was carried out by calculating the average number of living clumps on each span rope, at the end of each maintenance cycle. The data obtained for 45 days is then calculated using the survival rate formula.

Observation of ectoparasites on the thallus

Seaweed samples for observation of ectoparasites were taken at 5 (five) points of the cultivation area at each seaweed bond. The entire surface of the sample thallus was observed with the naked eye, and loops. The thallus suspected of having attached ectoparasites was separated and further observed under a microscope. The ectoparasites found were observed morphologically and matched with the ectoparasites identification key and counted. Wet-dry weight ratio of harvested seaweed, calculated by comparing 1 (one) kg of wet weight of harvested seaweed with the yield after drying in the sun (dry stored moisture content). This ratio is closely related to the quality of primary seaweed products, where it is affected by the quality of the waters during

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rearing.

Research Parameters

Daily growth

The Average Daily Growth Rate (LPH) or ADG (Average Daily Gain) is calculated using the daily growth formula according to Mubarak et al (1990) using the formula:

$$ADG = \left[\sqrt[t]{\left(\frac{Wt}{Wo}\right)}\right] - 1\ x\ 100\%$$

Informations:

ADG = Average Daily Growth
Wt = Starting Weight (mg)
Wo = Final Weight (mg)
t = Maintenance Time (day)

Absolute growth

The average absolute growth of seaweed is calculated using the formula:

$$G = Wt\text{-}Wo$$

Where :

G = Average absolute growth (grams)
Wt = Weight of seaweed at the end of 45 days of rearing (grams)
Wo = Weight of seaweed at the beginning of rearing (grams)

Ectoparasite inventory

Observation data and identification of ectoparasites in the thallus were inventoried by making a list in the form of a table of observations and counting the number. After that the data were analyzed and discussed descriptively.

Data analysis

Data on morphological and physiological characteristics were analyzed by analysis of variance (ANOVA) at 5% test level using the SPSS 17 program. If there was a significant effect, the analysis was continued using Duncan's multiple range test.

Results and Discussion

This study shows the result of absolute growth of the same trend between sampling points (Figure 1). These results are in accordance with the results of observations on the same ectoparasite findings will produce the same growth. In this study it was found that the ectoparasites that were particularly dominant at all observation stations were barnacles, followed by worms and green mussels. These three types of ectoparasites comprise more than 90% of the ectoparasite population at all stations.

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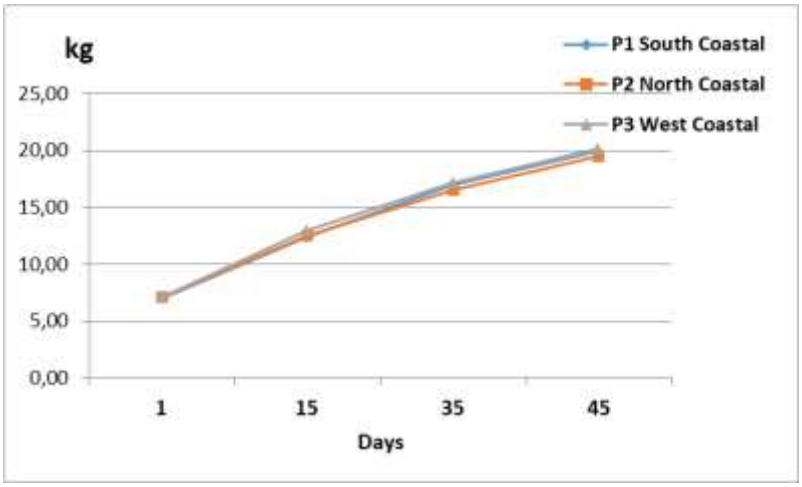

Figure 1. Absolute Growth of Kappaphycus alvarizii for 45 days

The results of observations during the study showed that the total population of ectoparasites at the southern coastal station of Mandalle waters was significantly different from the other two stations. Although on the south coast there are changes and fluctuations in the number of ectoparasites, the total population of the station is still higher than other stations (Table 1). The high difference in ectoparasite populations is thought to be because on the north coast, the nearest land is community settlement, while the south coast is aquaculture and the west coast is farther to the high seas than other stations.

Table 1. Observation Results of Ectoparasites in Seaweed Cultivation

Stasiun	S1	S2	S3	S4	S5	S6	S7	Total
P1 South Coastal	37	541	597	682	682	1.022	488	4.049
P2 North Coastal	102	686	505	447	447	625	912	3.724
P3 West Coastal	34	1.058	464	595	595	335	647	3.728

Keterangan:
S = Sampling

Ectoparasites attached to seaweed are dominated by barnacles and clam larvae, the presence of these ectoparasites can disrupt seaweed growth, according to Cokrowati (2016) true efficiency can inhibit seaweed growth. The part of the seaweed that is often attacked by clam larvae is the young end of the thallus and the outer skin. This can cause injury to the seaweed, making it susceptible to pathogenic bacteria.

According to Papalia (2009) pest attacks on seaweed are predators and attached biota of algae (Rhodophyta, Chlorophyta, Phaeophyta and Cyanophyta) as well as other types of biota such as Amphipoda, Tunicates, mollusks and Barnacles (Ballanus sp). While the type of disease is ice-ice (symptoms of disease) caused by attack of several types of pathogenic bacteria.

From the three observation stations, an absolute average growth of 12.83 kg was obtained. The absolute growth chart of all experimental samples shows the same trend at all stations. Meanwhile, the daily growth rate found at the three sampling points was an average of 2.30% per day. This indicates a relatively normal growth (Table 2).

Table 2. Growth Results Data

No	Stretch	Absolute Growth	Daily Growth	Daily Growth

		(grams)	(grams)	Rate
1	P1 South Coastal	13,00	0,289	2,33%
2	P2 North Coastal	12,40	0,276	2,25%
3	P3 West Coastal	13,10	0,291	2,32%
	Rata-rata	12,83	0,285	2,30%

All measured growth parameters, i.e. absolute growth, daily growth and daily growth rate showed no difference between all observation stations. This is thought to be due to similarities in ectoparasite type, water quality and substrate. Where the distance between the observation stations is only about 800 meters with the dominant substrate is moss and mud.

Conclusion

Based on the research and data analysis, it can be concluded that at all observation stations on the South, North and West coasts were all dominated by barnacle-type ectoparasites, followed by green mussels and worms for a total of 90%. While the absolute growth between all stations was relatively equal.

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