

# Seaweed Cultivation Techniques

## *Gracillariaverrucosa* in Pond Ujungpangkah District, Gresik East Java using Broadcast Method

Andi Rahmad Rahim

Lecturer of Aquaculture Program, Faculty of Agriculture, University of Muhammadiyah Gresik, Indonesia

**Abstract**— Seaweed is one of the sea cultivation commodities that are easy to be cultivated and have a good market prospect in improving coastal community empowerment. Moreover, the technology used to cultivate seaweed is also simple and inexpensive so it is suitable and easily adapted by coastal communities. Type of seaweed that has been cultivated in brackish water is *Gracilaria* sp. One of the methods used for seaweed cultivation *Gracilaria verrucosa* is the broadcast method or spread. This method provides an increase in the growth length from 5 cm to 5.8 cm for 42 days and the weight of *Gracilaria verrucosa* seaweed from 10 grams to 14.1 gr for 42 days. This growth was influenced by ambient temperature including temperature 28-33 ° C, salinity 5-17 ppt and degree of acidity (pH) 5-8.

**Keywords**— Broadcast method, environmental factor, *Gracillariaverrucosa*, growth, weight.

### I. INTRODUCTION

*Gracilaria* is a species of seaweed that increased production from 1990 to 2010 [1], the world market demand for seaweed continues to increase by 3-5% per year [2]. Intensification of *Gracilaria* cultivation continues to be encouraged to meet the needs of industry, one of them by expanding the production area. *Gracilaria verrucosa* is mostly cultivated in ponds because it can live in waters of 15-30 ppt [3].

Seaweed cultivation business (*Gracilaria* sp.) Often fails due to lack of attention to several factors that can affect the growth rate of seaweed in cultivation, including: location of cultivation, management, seeds, season, location and especially selected cultivation method. Factors mentioned above, greatly affect the level (productivity) production of seaweed cultivated [4].

*Gracilaria verrucosa* can be cultivated by several methods, one of them using the broadcast method or spread. The method is a method commonly chosen by the farmer's community because the technology is easy, cheap, without the need for extra care [5]. The results of this study are expected to contribute as one source of information in an effort to support the development of seaweed cultivation *Gracilaria verrucosa* with the use of the broadcast method or spread in the pond.

### II. MATERIALS AND METHODS

**Time and place.** The study was conducted for 42 days. In March to May 2018, in the brackish water ponds of Pangkah Wetan Village, Ujungpangkah District, Gresik Regency, East Java Province.

**Land preparation.** Preparation of land by preparing waring for happa to be made for seaweed cultivation in ponds. Happa is made of black waring with size 3 x 4 x 0.5 with four sides, which on each side are given bamboo as a rebuttal.

**Procurement and Selection of Seedlings.** Seeds used are good seeds with the following criteria:

- cylindrical rod/tallus appearance, clean, fresh, hard, not slimy, no fishy smell, and not pale
- Seeds with many branches and grow centered from one part of the base and spread
- Seed should be homogeneous not mixed with other types
- Selecting seeds with elongated talus ranges from 15-30 cm

**Seedling.** Seeds that have been obtained in pieces weighing 10 grams and then in stocking by using the method of spread (broadcast method).

**Seedling maintenance and water quality.** Seed maintenance is done once every week, for 42 days of research. Water quality monitoring, such as temperature, pH, and salinity, is also carried out.

*Gracilariaverrucosa* seaweed growth. Growth and weight of *Gracilaria verrucosa* using formula [6]:

$$\text{Growth} = \frac{\ln(\text{Length end}) - \ln(\text{Start length})}{\text{time}} \times 100\%$$

$$\text{Weight (g)} = \text{final weight} - \text{initial weight}$$

### III. RESULTS AND DISCUSSION

#### Growth

Based on existing data from figure 1, the growth of seaweed each week has increased. The initial length was only 5 cm at the beginning of the spread to 5.8 cm. The scattering method used has a weakness that is seaweed is only spread and located in the bottom of the pond less sunlight, thallus many of which are covered in silt deposits resulting in inhibition of long growth in seaweed and also less current. According to [7] the role of the current is to avoid the accumulation of silt and epiphytes attached to the thallus, with the presence of mud attached to the seaweed thallus indicating that the movement of water at the depth is not good because it cannot clean the dirt and the sediment attached to thallus that can block the growth of seaweed itself.

#### Weight

Based on the graph figure 2 obtained results that indicate that the growth of weight in *Gracilaria verrucosa* seaweed in ponds increased weight (g) every week. The initial weight of spreading using seed seaweed weighing 10 grams increased to 14.1 gr. The lack of growth in this study can be influenced by environmental factors ie temperature. Temperatures in the waters exceed the normal limits of seaweed maintenance that is 20-28°C [8]. In addition, factors that affect the growth of seaweed is the intensity of sunlight, depth, current, weather and climate.

#### Environmental factor.

**Temperature.** Water temperature during the study is between 28-33 ° C. [9] states that seaweed grows and develops well in waters that have a temperature range of 20-28° C. Temperature affects the process of seaweed breeding because it helps the process of photosynthesis in the waters. If in temperatures the water does not match will inhibit the growth process.

**Salinity.**Based on the results of the average pH measurement at the seaweed cultivation pond-*Gracilaria*

*verrucosa* ranged from 5-17 ppt. The good salinity condition for seaweed growth is between 15-34 ppt

**A degree of acidity (pH).** The degree of acidity (pH) of the waters during the study ranged from pH 5-8, the pH range still qualified as a process of cultivation in ponds. As in [9] seaweed growth requires optimal sea water pH ranging from 6-9. According to SNI 7579.1 (2010) that the pH of waters required for seaweed cultivation ranges from 7-8.5.

### IV. CONCLUSION

The method used in seedling distribution using the spread method. However, by using this method the growth of seaweed is <3%. Long growth increased from 5 cm at baseline to 5.8 cm at the end of the study. The initial weight of the spreading using the seaweed seeds weighing 10 grams increased to 14.1 g until the end of the study for 42 days. Environmental factors include water temperature during the study of 28-33 ° C, salinity 5-17 ppt and pH 5-8.

### REFERENCES

- [1] FAO.2005–2012. Cultured aquatic species information programme. *Eucheuma* spp. Cultured Aquatic Species Information Programme. Text by G.C. Trono Jr. In: FAO Fisheries and Aquaculture Department [online]. Rome.
- [2] Bixler, H. and Porse, H. 2011. A Decade of Change in the Seaweed Hydrocolloids Industry. *Journal of Applied Phycology*, 23, 321-335.
- [3] Anggadiredja, J.T., A. Zalnika, H. Purwoto & S. Istini. 2007. Seaweed. The Swadaya spreader. Jakarta. 152p.
- [4] Putra, B.D., Riris, A., Isnaini. 2011. *Gracilaria* sp. Seaweed growth rate sp. with
- [5] Different Planting Methods in Kalianda Waters, South Lampung. *Maspari Journal* 03 (2011) 36-41.
- [6] Basith, T.A., Sri R., Restina, W.A. 2014. The effect of seeds obtained from selection or non-selection and tissue culture against growth rate, agar content, and Gel strength seaweed *Gracilariaverrucosa* which culture in the brackish water tank with a Broadcast method. *Journal of Aquaculture Management and Technology* Vol. 3, No.2,pp 18-24.
- [7] Subandiyono, Hastuti Sri. 2014. *Beronang and the Prospect of Sea Cultivation in Indonesia*. UPT UNDIP Press. Semarang.
- [8] Mamang, Nurfadly. 2008. Growth Rate of Seaweed Seeds *Eucheuma cottonii* With Thallus Origin Treatment Against Seeds Weight in Lakeba Waters,

Bau-Bau City, Southeast Sulawesi [Bogor Institute of Technology]. Bogor.  
[9] Zatnika, A. 2009. Technical Guidelines for Seaweed Farming. Agency for Assessment and Application of Technology. Jakarta.

[10] Zatnika, A. and Sri istini. 2009. Optimization of Alkali Treatment in Efforts to Improve the Quality of Agar from Seaweed (*Gracilaria* sp.). Agency for Assessment and Application of Technology. Jakarta.

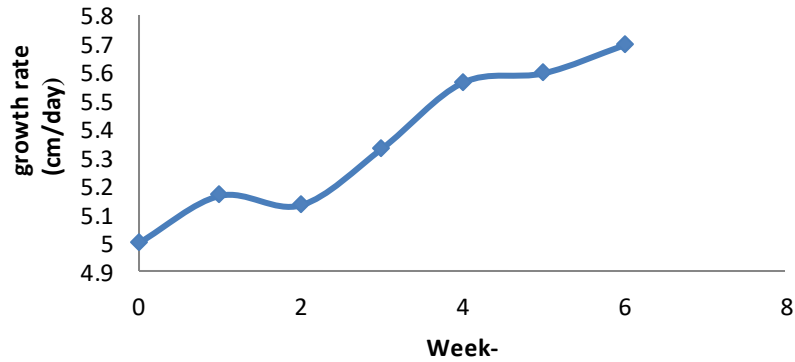


Fig.1: Graph of Seaweed Growth

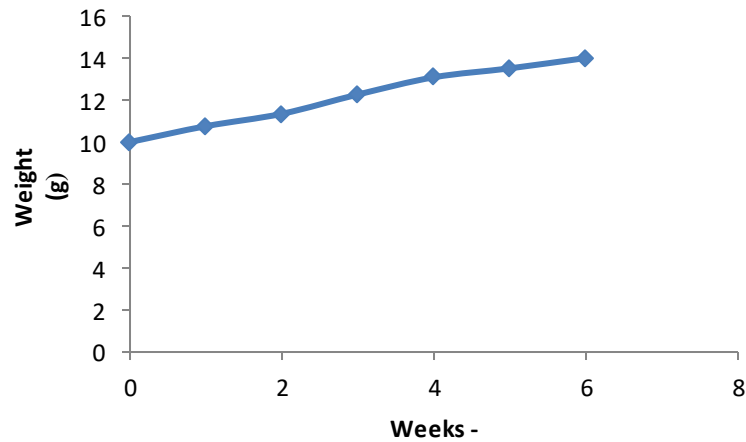


Fig.2: Graph of Growth Rate of Seaweed