
EMPOWERING FARMERS THROUGH SEAWEED DRYING HOUSE TECHNOLOGY INNOVATION AS AN EFFORT TO INCREASE PRODUCTIVITY

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Abstract

The people of Ohoidertawun village have known seaweed cultivation for a long time, their ability to cultivate seaweed is undoubted, on average each farmer has a seaweed cultivation business of 10 to 15 stretches (longline) with a length of 25 - 50 meters each. Based on information from the local community, each stretch of seaweed produces 30 - 40 kg of dried seaweed for one harvest, with the current price of seaweed reaching Rp. 15,000, it's certain that the income of each seaweed farmer ranges from Rp. 450,000 – Rp. 600,000 per stretch for one harvest or within 2 months. The problems that occur in post-harvest activities with the following identification results: 1). Drying dried seaweed in an inadequate or weathered place, 2). An open drying method that is very dependent on the weather, 3). It's necessary to carry out seaweed drying innovations. The purpose of this activity to increase the productivity of seaweed farmers by utilizing seaweed dryer house technology. As a result, there has been 1 unit of drying house measuring 5 x 5 x 4 m (p x l x t) which can accommodate 3000 kg of wet or 300 kg dry seaweed, with a maximum temperature of 45°C, drying time of 2 – 3 days, not exposed to dust and dirt and avoided from rain, with a partner income of Rp. 4,500,000 for one production, and in 1 week two productions are carried out, the partner's 1-week income reaches Rp. 9,000,000.

Keywords: Drying house, Farmer empowerment, Innovation, Productivity, Seaweed.

INTRODUCTION

Seaweed is a type of marine organism that is generally used as a basic ingredient for making various food or cosmetic products. *Eucheuma cottonii* is a type of seaweed that produces carrageenan that is widely needed for the industrial, pharmaceutical, and food sectors (Nurjanah *et al.*, 2019). The seaweed harvesting process is usually at the age of 45 days for industry and food. Drying is a method used to remove some of the water content in foodstuffs. The advantage of the drying method is that the material becomes more durable and the volume of the material becomes smaller so that it is easy to transport.

In 2022, there are two areas in Indonesia that have been designated as *Seaweed Estate / Seaweed Cultivation Villages* by the Coordinating Ministry for Maritime Affairs and Investment (Kemenko Marves) in collaboration with the Ministry of Marine Affairs and Fisheries (KKP), namely East Sumba, East Nusa Tenggara and Southeast Maluku Regency. The designation of Southeast Maluku as a Seaweed Cultivation Village cannot be separated from the activities of coastal communities who mostly work as seaweed farmers.

One of the coastal villages whose people are engaged in seaweed cultivation is Ohoidertawun village. The people of Ohoidertawun village have known the cultivation business for a long time rumput laut, sehingga kemampuan mereka dalam membudidaya rumput laut sudah tidak Undoubtedly, on average, each farmer has a seaweed cultivation business of 10 to 15 stretches

(*longline*) with a length of 25 - 50 meters each. Based on information from the local community, each stretch of seaweed can produce 30 - 40 Kg of dried seaweed for one harvest, with the current price of seaweed reaching Rp. 15,000, it is certain that the income of each seaweed farmer ranges from Rp. 450,000 to Rp. 600,000 per stretch for one harvest or within 2 months.

The problem found is in the process of drying seaweed which by the community only by placing it on the floor outside the house in an open state, will have a great impact on the quality condition of seaweed, where the grass will be easily exposed to dirt and dust. In addition, rainy weather conditions will have an impact on the length of the drying process. In addition, the way to handle the seaweed harvest that only takes and directly dries without paying attention to seaweed sanitation and hygiene will certainly have an impact on the quality of the seaweed itself.

The purpose and benefits of this activity are to produce technological innovations in the form of a drying house that can accommodate 3000 kg of seaweed, with a drying period of 2-3 days, not exposed to dust and dirt and avoided rain, in addition to that there is an increase in the ability of farmers in good seaweed harvesting techniques, the existence of this technological innovation can be a pilot for other seaweed farmers to make a drying house as an effort to improve quality seaweed. And for the local government, it can make this program into a seaweed development policy as a center in this area.

LITERATURE REVIEW

Eucheuma cottonii type of seaweed is a producer of carrageenan, which functions as a suspension, stabilizer and has the ability to hold water *holding capacity* (WHC) so that it is often used as a moisturizer in the cosmetics industry in addition to being used in the food sector (Nurjanah *et al.*, 2019). This provides an overview of the high seaweed market demand for cosmetic and food products.

With the vast potential of cultivation land in the Kei Islands, it makes people living in coastal areas to do seaweed cultivation business. Seaweed cultivation activities in the Kei Islands are generally carried out using the longline method, because this method is not only easy and flexible in choosing a cultivation location, but also the capital spent is still more affordable for people in coastal areas. (Hamid & Kamisi 2012). As an overview of cultivation activities with the longline method, seaweed seedlings will be tied to ropes with a distance of about 20-25 cm, with a rope length of 30-50 m. To float seaweed, people usually use used bottles of 600 ml mineral water drinks, in addition to using black ball buoys as the main buoys at both ends of the rope so that the seaweed does not float on the surface and remains at a depth of 6-12 cm below sea level, the buoys are tied to ropes with a distance of 10-15 cm. After reaching the harvest age, farmers will harvest and then carry out the seaweed drying process.

Seaweed drying is a method to reduce water content which is done by removing or evaporating part of the water content using heat energy. The purpose of the drying process is to reduce the moisture content of seaweed so that the material becomes more durable, reduce the volume and save costs during the transportation process. Currently, the drying process that is often used is *hot air drying* or drying using sunlight (Orilda *et al.*, 2021).

Proses pengeringan rumput laut yang dilakukan secara tradisional memerlukan waktu yang cukup lama dan memiliki resiko kerusakan atau kehilangan kualitas akibat cuaca yang tidak menentu, menggunakan metode pengeringan yang sangat tradisional yaitu dengan dijemur di bawah sinar matahari langsung dan diletakan pada lantai yang beralas tarpal. Proses ini memakan

It takes about 4-5 days, however, if it rains during the drying process, the drying time will be longer and can even result in the quality of the seaweed being non-uniform. Therefore, seaweed farmers must pay attention to weather conditions and keep seaweed dry during the processing process (Andika *et al.* 2024).

Another factor that must be considered in the process of drying seaweed is moisture. Moisture can affect the content of the material during the drying process and storage process. Relative humidity has a great influence on the drying process using different tools, besides that room conditions also have a great influence on room humidity. The working mechanism system of the tool and the airflow rate in the tool also greatly affect the relative humidity. The hotter the temperature used in the drying process, the smaller the relative humidity. (Chandra & Witono 2018).

Thus, as part of the innovation of the seaweed drying process, a drying house was made using UV plastic to absorb heat, while to maintain humidity an exhaust turbine was used.

RESEARCH METHOD

This activity will be carried out for 6 months, starting from June to November 2024, with the location of the activity in Ohoidertawun village, Southeast Maluku Regency. The stages of the activity include the manufacture of a dryer house measuring 5 x 5 x 4 m (p x l x t) with a roof and UV plastic walls with the aim of absorbing heat, for the frame using mild steel while to overcome room humidity using 1 unit of exhaust turbine placed at the top. The next stage is to test the use of the dryer house, for measurements using temperature and humidity measuring devices, as well as scales to measure the initial and final weight. The data analysis used is a descriptive analysis that provides a comparative picture of the results of the use of drying houses with traditional drying methods used by the community.

This drying technology will accelerate the process of drying seaweed from 5 to 7 days (traditional method) to 2 to 3 days. Another convenience is that farmers no longer need to move seaweed at night or when it rains, because seaweed is already well stored in the dryer house.

RESULTS AND DISCUSSION

The coast of Ohoidertawun village is a very feasible location to be used as a location for seaweed cultivation. This is supported by the enthusiasm of the surrounding community in doing business because the livelihood as a seaweed farmer is the main job. Seaweed cultivation is not only easy to run, but the seaweed harvest is fairly fast, which is for 45-55 days, so it is expected to provide a sustainable monthly income for seaweed farmers.

The partner in this activity is Mr. Tandri, he has a seaweed cultivation land with a total of 15 stretches (longline) with an average seaweed harvest of 6000 kg of dried seaweed for one production period. It's just that due to the limitation of the drying place, he was only able to harvest half of the total crop. In addition, the length of the drying process makes the remaining seaweed past its proper harvest life, this also has an impact on decreasing the quality of seaweed.



Figure 1. The process of drying dried seaweed belonging to partners

In the picture, it is clearly seen that it is a shortcoming of seaweed cultivation business activities carried out by partners, where the drying process only uses the floor. Open drying like this will result in a decrease in quality because seaweed is exposed to dust and dirt, in addition to rainy conditions will have an impact on the drying process that takes longer and has an impact on sales failure or a decrease in income. The process of drying seaweed that is traditionally carried out takes a long time and has the risk of damage or loss of quality due to uncertain weather. (Andika et al, 2024).

As a solution to this problem, a drying house measuring 5 x 5 x 4 m (p x l x t) was made that can accommodate 3000 kg of wet or 300 kg of dry seaweed, with a drying period of 2 – 3 days, not exposed to dust and dirt and avoided from rain. The following is an overview of the manufacturing process.

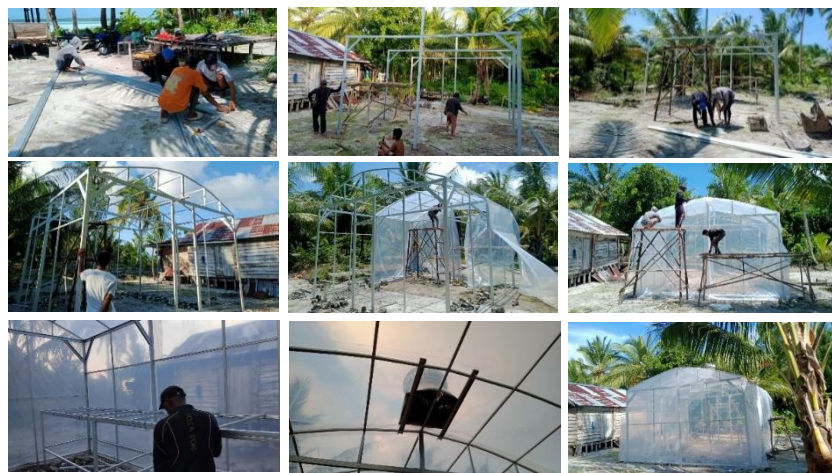


Figure 2. Process of making a Dryer House

The work on this drying house takes approximately 1 month, there are several materials that must be ordered from outside the area such as UV plastic and turbine exhaust. The capacity of this dryer house reaches 3000 kg or 3 tons of wet seaweed, and produces 300 kg of dried seaweed, and this dryer house is made with a roof and UV plastic walls with the aim of absorbing heat, while to overcome room humidity an exhaust turbine will be used at the top. This drying technology will speed up the drying process of seaweed from 5 to 7 days to 2 to 3 days. Another convenience is that farmers no longer need to move seaweed at night or when it rains, because seaweed is already well stored in the dryer house, in contrast to the previous drying method which took up to 1 week to obtain dried seaweed. For more details, please see the following table.

Tabel 2. Comparison of seaweed drying method
Comparison of Seaweed Drying Methods

Description	Traditional	Home Dryer
Shape	Open	Closed
Maximum Temperature	35°C	45°C
Time	5 – 7 Days	2 – 3 Days
Revenue/production	Rp. 4.500.000	Rp. 9.000.000
Sanitation	Easily Exposed to Bacteria	Not exposed to bacteria
Hygienic	Easily Exposed to Dirt and Dust	Exposed to Dirt and Dust
Display	Uneven color	Merata

In the table, it is clearly seen that the comparison of the traditional drying method with the drying house method, the drying method with the drying house provides a solution to increase the productivity of partners, who previously only produced 300kg of dried seaweed, to 600kg in one production period or generate income of Rp. 9,000,000 in 2 months. In addition, at night or when it rains, partners no longer need to move seaweed, because it is stored well in the dryer house.

CONCLUSION

The dryer house measuring 5 x 5 x 4 m (w x l x h) that has been made can accommodate 3000 kg of wet or 300 kg of dry seaweed, with a maximum room temperature of 45°C, drying time of 2 – 3 days, so that in a week this dryer house is able to produce 600kg of dried seaweed, not exposed to dust and dirt and avoided from rain, with partner income reaching Rp. 9,000,000 for one production period, namely 2 months. This activity also answers the goal, which is to increase the productivity of seaweed farmers. Then partners are also equipped with training in good seaweed harvesting techniques by paying attention to sanitation and hygiene for dried seaweed products, so that they can provide understanding to partners regarding the importance of maintaining the quality of seaweed, starting from harvesting in the sea, drying process to packing.

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