

Fermentation Booster Oven to Increase Tape Production In Gambut District, Banjar Regency, South Kalimantan

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ABSTRACT

The fermentation process contains the addition of microorganisms to make sticky rice into the desired product. The microorganisms used are yeast. The fermentation process takes quite a long time, making tape production take longer. This community service program aims to increase the productivity of sticky rice tape using a fermentation booster oven. This activity was carried out in Pematang village, sub-district. Gambut district. Banjar, South Kalimantan from April 3 2023 to September 15 2023. The program selection was based on considerations regarding the potential of Pematang village as a center for tape production in the sub-district area. Gambut district. Banjar, South Kalimantan. This Oven Booster tape technology was created with the aim of developing innovation and increasing the productivity of the potential tape business in Pematang village. This activity was carried out by discussing the tape making process and introducing Oven Booster tape technology. The use of this technology received a positive response from the target audience, especially regarding the potential for increasing productivity and quality of tape production.

Keywords: *Glutinous rice tape, Fermentation Booster, Oven Booster*

1. INTRODUCTION

Sticky rice tape is a traditional fermented food made from sticky rice using yeast through the fermentation process (Marniza, 2020). Sticky rice tape is obtained by steaming the raw material, namely sticky rice, inoculating it with tape yeast and storing it at room temperature for a certain period of time. The process of making tape involves a fermentation process carried out by the yeast *Saccharomyces cerevisiae* (bacteria found in yeast). This yeast has the ability to convert carbohydrates (fructose and glucose) into alcohol and carbon dioxide. The fermentation process for sticky rice tape is carried out by steaming the sticky rice for approximately 30 minutes. Then the results are steamed and mixed with yeast synchronously, generally the optimal temperature for the tape

fermentation process is 35°C-40°C (**Devindo, 2021**). Tape resulting from fermentation with yeast, which is dominated by *Saccharomyces cerevisiae*, is generally semi-liquid, soft, has a sweet-sour taste, contains alcohol, and has a sticky texture. The quality of the sticky rice tape produced can be less than perfect due to the fermentation process taking too long and the addition of excessive inoculum with a fermentation time of 4 days, this long enough time means tape connoisseurs have to wait for the tape to mature with a distinctive taste. Fermentation ovens can shorten fermentation time to a shorter length (**Islami, 2018**). Alcohol levels also need to be considered, because alcohol levels that are too high in the tape can cause the tape to become very acidic and less popular with the public, In the traditional fermentation process, tape makers need to open and close the fermentation container, to determine the success rate of fermenting sticky rice tape. This can cause the fermented rice tape to be of poor quality and even fail (**Negara et al., 2020**).

Various food ingredients containing carbohydrates can be turned into a traditional dish known as tape. Usually, the ingredients used to make tape are cassava, white sticky rice, black sticky rice, or sorghum. Tape is a product that appears after going through a fermentation process which involves complex changes in the ingredients. In the case of cassava, the starch in it is converted into sugar with the help of micro organisms called yeast or yeast (**Suriasih, 2001**). The curing process is carried out in a closed or dark room in order to produce the best quality sticky rice tape (**Kanino, 2019**). Tape has a soft texture, sweet and sour taste, and contains little alcohol. During fermentation, tape undergoes various biochemical changes due to the activity of microorganisms.

The process begins by soaking the sticky rice for about 12 hours to avoid excessive sweetness after fermentation. Then, the sticky rice is cooked until cooked and cooled until completely cold. The yeast is crushed into a fine powder and sprinkled evenly over the cooled sticky rice. Next, the fermentation process involves storing the sticky rice for 7 days before the sticky rice tape is ready to be served.

Several factors that influence the quality of the tape include soaking the rice for 12 hours to avoid excessive hardness after fermentation. Apart from that, storage of sticky rice must be done in a closed place to prevent the entry of air which can inhibit fermentation. Storage time must also be considered because it can increase the alcohol content in the tape. The higher the alcohol content, the tape can turn into wine. The type and amount of yeast used also affects the final tape result. Too much yeast can speed up fermentation and produce a tape that is too hard, while too little yeast can produce a tape that is not sweet enough and hard. Several other factors that can influence the tape making process include the cleanliness of the manufacturing site, storage time, use of inappropriate yeast, and other factors.

In the South Kalimantan region, a variation of tape that is quite well known is the typical lakatan Gambut (Tape Gambut). Its characteristic that can be seen with the eye is its round shape like a ping pong ball and its green color. Sticky rice tape is a characteristic of Gambut District, Banjar Regency. In this area, there are many tape manufacturers produced by home industries. Only some people know that most of the Peat Tape comes from Jl. Pematang Km. 5 Pematang Village, RT 01, RW 01, Gambut District, Banjar

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Regency. Most people are familiar with the typical Banjar culinary dish called tape Gambut.

Some of the Tape Gambut craftsmen sell this culinary delight by traveling around the cities of Banjarmasin, Martapura and Banjarbaru. And now you don't need to go to the market or stall in Gambut to buy tape, because there are many tape sellers on the side of the road who open their stalls from morning to evening.

Mr. Ansori, as a sticky rice tape craftsman, said that every time before Eid, he can produce 3 to 4 times, with one production using 10 liters of sticky rice. Because demand is increasing, especially during Eid al-Fitr, production must also be increased. Increasing production is often hampered by the duration of the fermentation process, which takes between 5 and 7 days.

Partner problems that can be identified are as follows:

1. The duration/time of the tape production/fermentation process is around 5-7 days, which is an obstacle in tape production.
2. Lack of knowledge of the application of technology related to tape production.

Based on the results of observations and interviews with partner community groups, it was concluded that the Pematang Village community still needs technology that can be applied to increase tape production and has very limited knowledge of the application of technology. To overcome partner problems, it is necessary to apply new technology in the process of making sticky rice tape.

One technology that can be applied is a sticky rice tape fermentation booster oven. The sticky rice tape fermentation booster oven is an oven equipped with automatic controls that is designed and engineered in such a way that it becomes a tool that functions to speed up the tape fermentation process. This sticky rice tape fermentation Booster Oven maintains the temperature in the fermentation container at a pre-set temperature. This process will continue repeatedly until the alcohol content has reached 50% and the buzzer will automatically sound indicating that the sticky rice fermentation process has been completed. This sticky rice tape fermentation booster tool uses the main components of a heating element, DC fan, relay, LCD, MQ3 sensor, DHT11 sensor and buzzer. Each of these components is controlled automatically via the Arduino nano microcontroller. At a temperature of 40°C the fermentation period takes 46 hours, which is the fastest time obtained from testing with a humidity value of 52 and an alcohol content reaching 50%. (**Rifky, 2023**). The MQ3 sensor functions to measure the alcohol content that evaporates from alcoholic liquids. In the sensor there is a layer of SnO₂ which is conductive which functions to measure alcohol gas in the air. The power consumption of the MQ3 sensor is around 750mW (**Latupeirissa, 2015**). The DHT22 sensor functions to measure temperature and humidity. The DHT22 sensor does not need to be calibrated because the temperature reading process will be stored in the OTP program memory, so that when the sensor reads data in an electrical signal, it will automatically be converted into air temperature degrees (**Abdulrazzak, 2018**).

Based on the description above, the sticky rice tape fermentation booster oven which is equipped with a fermentation room control and monitoring system is the appropriate technology to overcome the problems faced by partners. This program will be

implemented using the method of introducing and training partners. The partners of this program are a group of sticky rice tape craftsmen in Pematang Village who have a strong desire to develop their tape production business so that they can meet market demand.

To overcome the above partner problems, a community empowerment program will be carried out with the following objectives:

1. Increasing public knowledge about sticky rice tape fermentation booster oven technology.
2. Increasing the productivity of the tape crafts community by implementing glutinous tape fermentation booster oven technology to shorten the fermentation/production period of sticky rice tape.

2. METHOD

Community service in increasing the productivity of sticky rice tape craftsmen in Pematang Village, District. Gambut District. Banjar South Kalimantan was implemented in the form of activities to introduce fermentation booster oven technology and training in making sticky rice tape using a fermentation booster oven. This activity is a community service activity at the Islamic Kalimantan University Muhammad Arsyad Al Banjari Banjarmasin. Community service is carried out in Pematang Village, District. Gambut District. Banjar, South Kalimantan. This community service follows four phases as presented in Figure 1.

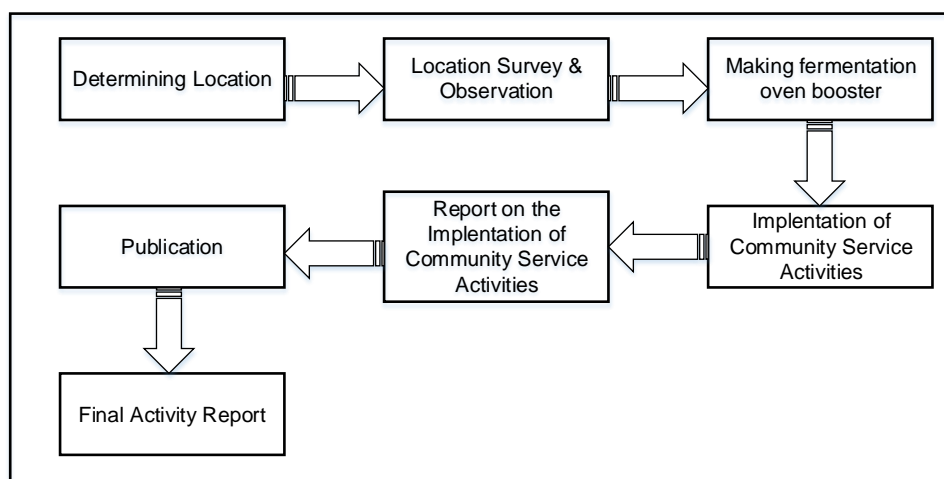


Figure 1. Four phases in community service

Stage 1

This stage includes situation analysis, data collection and problem identification. The Community Service Team conducted a situation analysis by conducting surveys at partner locations and interviews about the process of making sticky rice tape.

Stage 2

This stage includes preparing the fermentation oven booster which will be used in carrying out this community service activity, where this preparation is carried out in the

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electrical engineering laboratory at the Islamic University of Kalimantan MAB Banjarmasin.

Stage 3

The implementation stage was carried out with materials and discussions about the process of making sticky rice tape, introducing fermentation booster oven technology along with the circuit and workings of the equipment as well as demonstrating the use of a fermentation booster oven. This activity was attended by residents of Tape craftsmen as the target audience and several Pematang Village officials.

3. RESULTS AND DISCUSSION

Preparing a fermentation booster oven involves several things, including manufacturing, calibrating the oven room temperature with a setting of 40°C and an alarm. If the alcohol content in the room reaches 50%, it indicates the fermentation process has been completed. This fermentation booster oven is made using a heating element that will heat the oven chamber to a temperature of 40°C, an MQ-3 sensor to detect alcohol levels and a microcontroller to control the fermentation booster oven. The alcohol level detected by the MQ-3 sensor will be maintained until the alcohol level reaches 50% which will automatically activate an alarm indicating that the tape fermentation process has been completed (**Dewantoro, G, 2015**). Figure 2 shows the manufacture, measurement and calibration of a fermentation booster oven.

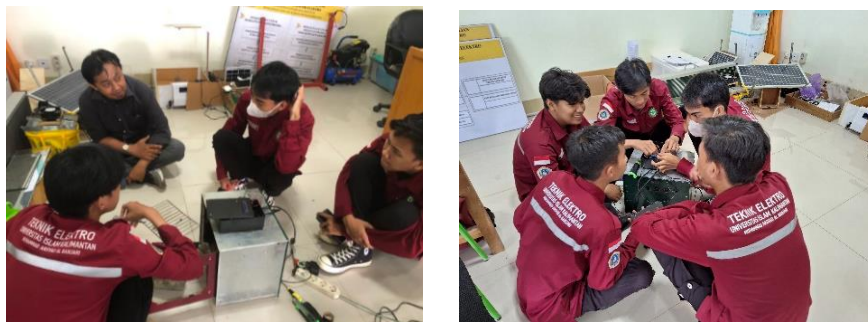


Figure 2. Making, measuring and calibrating a sticky tape booster oven



Figure 3. Introduction to Fermentation Booster Oven Technology



Figure 4. (a) Glutinous rice tape resulting from the fermentation Booster Oven (b) Filling out the questionnaire

The implementation of community service activities was carried out by discussing the process of making sticky rice tape, introducing fermentation booster oven technology and demonstrating the use of a fermentation booster oven. In this activity, residents of sticky rice tape craftsmen as the target audience learned to use fermentation booster oven technology and compared the results with conventional sticky tape (figure 3-4).

After testing the manufacture of sticky rice tape using a fermentation booster oven, the quality of the resulting tape was measured by comparing it with tape produced using the conventional method and the response obtained was as shown in table 1.

Table 1. Target audience responses to the comparison of sticky rice tape results using fermentation Booster oven with conventional production

No	Question	Response		
		1	2	3
1.	Increased Production	20	-	-
2.	Appearance of intact tape	20	-	-
3.	The texture is soft and runny	16	4	-
4.	The aroma is very fresh and specific to tape	7	13	-
5.	The taste is sweeter, slightly sour	7	13	

Note. 1 = Better; 2 = Same; 3 = Not Good

Measuring the quality of sticky rice tape was carried out through the response of the target audience to the comparison of tape results using a fermentation booster oven with conventional tape making. The comparisons made included, among other things, the appearance of the tape, soft texture and water content, the unique freshness of the tape's aroma and the taste of the tape.

From the results of measuring the quality of the tape, the fermentation booster oven technology received a positive response from the target audience, where 20 people responded that the tape appearance was more complete; 16 people stated that the texture of the tape was softer and more fluid and 4 of them said it was the same as the texture of conventionally made tape; 7 people stated that the tape had a fresher and more typical tape aroma, 13 other people stated that it was the same as the aroma of conventionally made tape; and 7 people said the tape had a sweeter taste, 13 other people said it had the same aroma as conventionally made tape.

Overall, the target audience stated that fermentation booster oven technology could increase their production.

4. CONCLUSIONS

Increasing the productivity of sticky rice tape craftsmen using Oven Booster fermentation technology in Pematang village is one of the Community Service programs of Kalimantan Islamic University MAB Banjarmasin which will be implemented from April 3 2023 to September 15 2023. The selection of the program is based on considerations regarding the potential of Pematang village as a production center tape in the sub-district area. Gambut district. Banjar, South Kalimantan. This fermentation Booster Oven technology was created with the aim of developing innovation and increasing productivity of the potential tape business in Pematang village. This activity was carried out by discussing the tape making process and introducing fermentation Booster Oven technology. The use of this technology received a positive response from the target audience, especially regarding the potential for increasing productivity and quality of tape production.

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