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POTENTIAL OF HOTONG (*Setaria italica* (L.) P. Beauv) FROM BURU ISLAND, INDONESIAN, MALUKU PROVINCE AS A FLOUR-BASED FOOD

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ABSTRACT

Hotong *(Setaria italica* (L.) P. Beauv) is a type of food plant that is used by the people of Buru Island, Maluku. The hotong is a plant whose contents are similar to the rice plant. Hotong seeds have quite high nutritional content, namely containing 11.18% protein, 2.36% fat, 73.36% carbohydrates, 11.78% water, and 1.32% ash. The energy produced per 100 grams of hotong seeds is 359 calories. Hotong plants can be used as an alternative commodity in a carbohydrate-produce food diversification program. Various local carbohydrate source commodities can be produced into flour to substitute wheat needs, save the country's foreign exchange and increase food security. Based on the availability of raw materials and prices, hotong has the most potential to be processed into flour. Hotong research results are the most numerous among carbohydrate source commodities. Until now, the name has not been able to be utilized by the public, compared to rice and wheat. This is one consideration that hotong flour can improve the image and interest of users. Hotong flour, with various technological variants, can be used for various flour-based food products, but nationally the real impact on reducing wheat consumption is still not significant. Therefore, it is necessary to discuss the prospects and potential for its use in the food industry.

Keywords: *food, hotong, nutrition, carbohidrate.*

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INTRODUCTION

Hotong (Ambonese) or millet (Javanese or sekoi *(Setaria italica)* is a type of small-seeded cereal (milet) that was once the staple food of Southeast Asian people, before rice cultivation was known. This plant was the first to be cultivated among the various types of millet and now it is the millet with the widest cultivation throughout the world (Muhamad, 2023). Hotong *(Setaria italica)* is a wheat-like plant that still comes from the same family as wheat, namely the Poaceae plant family. Hotong is an annual plant that grows in tall clumps. 60-150 cm with an average harvest age of 75-90 days after planting. In Maluku, hotong is very popular as a food crop, hotong contains high nutrition so it has the potential to become a functional food ingredient that has high economic value. Maluku Agricultural Technology Research Center stated that the carbohydrate content of hotong is similar to the carbohydrate content of rice. However, the protein content is higher than the protein content of other carbohydrate sources (rice, potatoes) (Bremar, 2020).

Hotong beans have a moisture content of 9.03%, a condition that meets cereal storage standards. However, in flour form, the water content is much lower (6.82%). This is partly because the flouring process

generates heat and has an impact on reducing water content. The fat content of hotong (3%) is equivalent to sorghum (3%) and higher than the fat content of rice and wheat (1%). Meanwhile, the protein of hotong seeds (14%wk) and hotong flour (13%bk) is higher than that of rice (6-10%bk), sorghum (8-10%bk) and wheat (8-12%bk) (Malawat, 2023). Various research aims to find standardized cultivation techniques, harvest and post-harvest technology, and the marketing chain, so that the development and use of hotong can be wider, such as rice and sorghum. There are a number of factors that hinder the development of hotong, including because it is not yet widely known in society (Rahma, 2021). Apart from that, the basic price of hotong is also unstable because the market is unclear so there are rarely farmers who want to cultivate it.

Hotong seeds have not been certified, unlike other types of food crops such as rice and corn. Maluku people have used hotong as processed snacks such as cakes, roti jala, noodles, and so on (Muhamad, 2023). The staple food of Indonesian society is still dominated by one commodity, namely rice. Even though this country has a variety of local commodities as sources of carbohydrates. Cereals (corn, sorghum, hanjeli, hotong). The decline in rice consumption is inversely proportional to wheat consumption. Consumption of food products made from wheat has continued to increase sharply since the introduction of flour in Indonesia. Various food products made from flour, such as noodles, rotary products, various wet and dry cakes, traditional foods, have become part of the diet of people around the world, including Indonesia (Hannanto, 2004). All flour available in Indonesia is imported.

Data shows that wheat imports in 2017 reached 11.8 million tons, equivalent to 36 trillion rupiah, or equivalent to one third of the volume of national rice consumption. Various local carbohydrate source commodities can be produced into flour to substitute wheat needs, save the country's foreign exchange and increase food security. Based on the availability of raw materials and prices, hotong has the most potential to be processed into flour. Hotong research results are also the most numerous among carbohydrate source commodities (Hardono, 2016). This is one consideration that hotong can be processed into flour. Hotong flour, with various technological variants, can be used for various flour-based food products, but nationally the real impact on reducing wheat consumption is still not significant. Therefore, it is necessary to look at its prospects and utilization in the food industry.

METHOD

The research was carried out used mechanical drying (tray dryer model EH-TD-300 Eunha Fluid Science). At 4 temperature levels: unheater, temperature 30, 45, 60^0C. The research was carried out in August-November 2022, at the Basic Biology Laboratory of Pattimura University. The tools used are tray dryer model EH-TD-300 Eunha Fluid Science, cutter, basin, wire mesh, digital scale, 80 mesh sieve, micrometer, grinder, sample bottle, 25 ml volume pipette, shaker, cuvette, spectrophotometer. The materials used are hotong, water, aluminum foil, label paper, acetone solvent (1:4b/v), Whatman filter paper no. 1. 3.3.

Research procedure

1. Prepare hotong with an average size of 20 g. obtained from the island of Buru Waeperang Village, Maluku, Indonesia.
2. Wash the hotong to remove dirt.
3. Plug the aluminum pipe in the middle of the hotong to get the same diameter.
4. Slice the hotong using a cutter. Then put the sliced hotong into a wire mesh (the weight of the container is known beforehand).
5. Weigh the material and wire mesh to determine the weight of the material and the weight of the wire mesh.
6. Dry the hotong slices using a tray dryer, with two treatments, first, drying with an unheater and second, drying at temperatures of 30, 45, 60 ºC, with each drying air speed of 1.5 m/s. During drying, weighing is carried out every hour. Drying is stopped until the weight of the material becomes constant.
7. After the weight of the material is constant, the material is placed in the oven for 3 hours at a temperature of 102 ºC to obtain the final weight or solid/dry weight of the material.
8. Smooth the hotong slices in each treatment using a grinder until evenly distributed.
9. Sift the ground hotong slices for each treatment using an 80 mesh sieve.
10. Fine hotong flour in each treatment is ready to be used.

RESULTS AND DISCUSSION

Hotong is a type of food plant that is used by the people of Buru Island, Maluku, Indonesia. The hotong is a plant whose contents are similar to the rice plant. Hotong seeds have quite high nutritional content, namely containing 11.18% protein, 2.36% fat, 73.36% carbohydrates, 11.78% water, and 1.32% ash. The energy produced per 100 grams of hotong seeds is 359 calories. Hotong plants can be used as an alternative commodity in carbohydrate-producing food diversification programs because they have high nutritional content. Hotong seeds have important economic value as a raw material for making instant noodles, energy drinks and food for toddlers. Apart from that, the high protein content allows hotong seeds to be used as food for diet programs, hotong seeds provide a feeling of fullness longer than rice (Muhamad, 2023). Physiologically, hotong plants are more like reeds, which usually grow on all types of land in the lowlands to the highlands. Until now, hotong plants are planted and cultivated on a limited basis on Buru Island (Maluku). Factors that can influence the growth and production of hotong plants include soil, climate, plant varieties, and cultivation practices (Malawat, 2023).

Description of the hotong plant.

The hotong plant is a type of rice or reed that grows in the lowlands to the highlands on all types of land. The hotong plant is an alternative food crop to replace rice that can grow well in dry lands that are not technically irrigated. Until now, this plant has been planted and cultivated on a limited basis on the island of Buru (Maluku). Cultivating hotong plants does not require as intensive maintenance as rice plants, making it possible to plant them almost anywhere by sowing the seeds. Hotong plants are annual plants (Rahma, 2021). The types of hotong that are widely cultivated on the island of Buru are: *Setaria italica* (L.) Beauv, *Setaria italica* (Var.) Metzgeri, and *Setaria italica* (Var.) Stramiofructa. The average length of hotong is 15.2 cm with a diameter of 1.2 mm and has an average weight of 5.7 g per panicle. Hotong seeds are 1.7 mm long, 1.3 mm wide and 1.1 mm thick. Hotong plants do not require special soil to grow. Hotong seeds can be used as a substitute for rice. The taste of hotong seed rice is not much different from the taste of rice, it's just that the texture is a bit tough compared to rice. The productivity of hotong on Buru Island, Maluku can reach 800 kg/ha when planted by direct planting. The results of the research show that hotong on Buru Island has a protein content of around 11.2% and fat of around 2.4%, while rice has a protein content of around 4-5% and fat 1-2%, which means the protein and fat content of buru hotong is higher. higher than the protein and fat content of rice. The carbohydrate content of hotong is around 73%, almost the same as the carbohydrate content of rice, which is around 70-80% (Breemer, 2020). The is a figure of the hotong plant.

Figure 1. Hotong plant

Classificate of hotong plants.

Kingdom : Plantae
Sub kingdom : Tracheobionta
Super divisi : Spermatophyta
Divisi : Magnoliophyta
Kelas : Liliopsida
Sub classis : Commelinidae
Ordo : Cyperales
Familia : Poaceae
Genus : Setaria
Species : *Setaria italica* (L.) P. Beauv

Water content of hotong flour during dried

The dried of hotong flour carried out in this research used 4 dried temperature treatments (unheater, 30, 45, 60 ºC) with an air drying speed of 1.5 m/s. From the results of observations that have been made, the air content during the drying process has decreased. The longer the drying process, the more obvious the decrease in the water content of the material will be. The effect of the length of the drying process on reducing the water content of hotong flour at the drying temperature treatment (unheater, 30, 45, 60 ºC) can be seen in Figure 2.

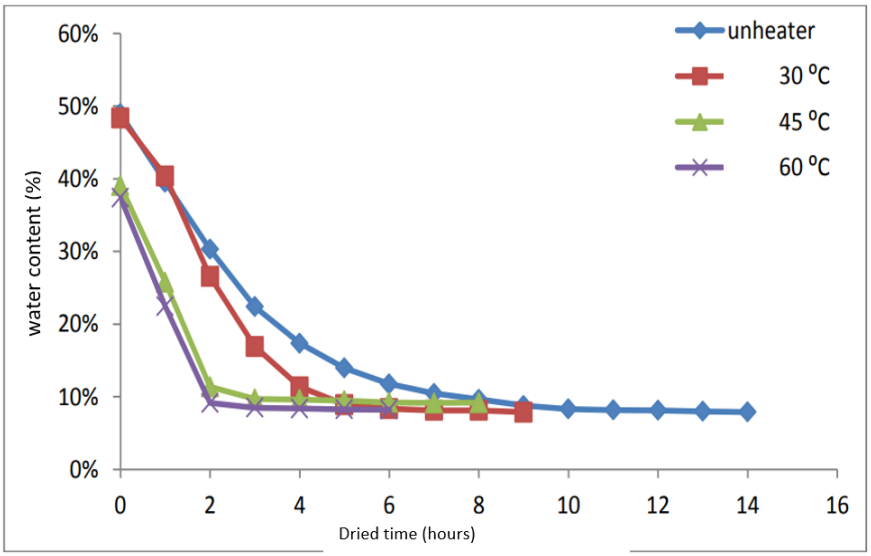

Figure 2. Average water content during the drying process of hotong flour with various temperature variations.

Figure 2 can see a decrease in water content without an unheater and used a temperature of 30 ^{0}C does not provide a significant decrease in water content, whereas treatment at temperatures of 40 ^{0}C and 60 ^{0}C provides a significant decrease in water content. This shows that the higher the temperature used, the more water evaporates in the material. will get higher. Hotong flour apart from being intended to fulfill the need for flour as an accompaniment to wheat, it is also an effort to preserve hotong. In fact, hotong flour can be used to substitute wheat in various products, both full and partial substitution according to the type of product. Products that require higher swelling power and elasticity, the percentage of substitution tends to be lower. The functional properties of hotong flour, including having a low glycemic index value, not containing gluten, high dietary fiber content, are selling points for the development of the functional food industry (Dinarto, 2010).

CONCLUSION

1. Changes in water content are greatly influenced by differences in temperature which causes the resulting drying rate to be different so that the resulting water content is also different.
2. The best hotong flour is obtained at a drying temperature of 45 ºC. The change in total volume is directly proportional to the drying time, where the longer the drying is carried out, the more the material being dried shrinks.

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