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Ethnobotany of Coconut Pulp (*Cocos nucifera*) and Tofu Pulp (*Glycine max*) as Main Ingredients for *Tempe Menjes* Production in Ketapang Village, Mojolangu Sub-District, Malang

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Abstract

Coconut pulp, a by-product of coconut processing for coconut milk or oil, as well as tofu pulp derived from the tofu production process, is crucial local resources within the daily life and cultural context of local communities. This study aims to document traditional knowledge surrounding the utilization of these two pulps, encompassing processing techniques into food products, nutritional values, and their roles in social and cultural activities. Through an ethnobotanical approach, this research explores the potential of these pulps as sources of innovation for more sustainable food development, as well as for preserving the sustainable use of local natural resources. The utilization of coconut and tofu pulp reflects not only local adaptations to the environment but also contributes significantly to maintaining cultural identity and local wisdom. The importance of this research lies in the preservation of ethnobotanical knowledge as part of cultural heritage and as a valuable resource for the sustainability of local communities in Ketapang Village and its surrounding areas.

1. INTRODUCTION

Ethnobotany is the study of the relationship between humans and plants within their cultural contexts, particularly in the utilization of plants for various purposes, including food. In Indonesia, which is rich in biodiversity and cultural heritage, ethnobotany plays a crucial role in preserving traditional knowledge and utilizing it for sustainability. One fascinating aspect of ethnobotanical use is the utilization of coconut and tofu pulps as food ingredients **[1].**

Coconut and tofu pulps are by-products of coconut and tofu production processes. Coconut pulp is the leftover material from grating and squeezing coconuts to obtain coconut milk, whereas tofu pulp is the solid residue left after soybean milk extraction in tofu production. Although often regarded as waste, these materials have great potential as nutritious and economical food sources **[2].**

The importance of coconut and tofu pulps in the food context of Ketapang community reflects a strong dependence on abundant local resources. These materials not only provide essential nutritional value but also demonstrate cultural adaptation in utilizing available resources. In this context, ethnobotanical knowledge is key to understanding how local communities maintain a balance between the use of natural resources and environmental sustainability **[3]**.

By utilizing coconut and tofu pulps as food ingredients, waste is reduced, and the nutritional potential of these already available materials is maximized according to the principles of efficiency and sustainability taught in Islam. Ethnobotany not only provides a foundation for preserving local wisdom but also contributes to developing more sustainable and resilient food strategies for the future **[4].** By understanding the role of coconut and tofu pulps in this context, we can appreciate the cultural and natural heritage of Ketapang community while preserving environmental sustainability in the region.

2. MATERIALS AND METHODS

The method used in this research is Participatory Observation, where the researcher actively participates in the observations made by the residents of Ketapang village. The interview method was carried out using interview techniques and Q&A sessions related to products among the residents of Ketapang village regarding the processing of coconut and tofu pulps into tempe menjes as food ingredients.

3. Results

The results of interviews and observations among the residents of Ketapang village regarding the processing of tempe menjes from coconut and tofu pulps indicate that some residents mentioned that these pulps can also be used as animal feed. However, most of the local residents in Ketapang village indicated that coconut and tofu pulps are mainly processed into tempe menjes products. According to the local residents, it would be wasteful to discard tofu and coconut pulps as they have many benefits. One of the benefits is as a food ingredient, such as tempe menjes, which can serve as an economic value for the residents and become local wisdom of the community as a tempe menjes production village (Table 1). In addition to utilizing tofu and coconut pulps, the production of tempe menjes also involves the use of mold for the fermentation process. The production of tempe menjes has been passed down since the 1990s from ancestors. Until now, tempe menjes is still widely favored by people of all ages.

Tabel 1. Ingredients for Tempe Menjes Production

No.	Ingredients	Function
1	Coconut Pulp (*Cocos nucifera*)	Main ingredient for *tempe menjes* production
2	Tofu Pulp (*Glycine max*)	Main ingredient for *tempe menjes* production
3	Mold (*Rhizopus* sp.)	Fungus for fermentation process

Figure 1. Coconut Pulp (*Cocos nucifera*)

Figure 2. Tofu Pulp (Glycine max)

Figure 3. Mold (Rhizopus sp.)

Figure 4. The production process of tempe menjes (a) Mixing and pressing (b) Sieving (c) Steaming (d) Mold inoculation (e) Molding (f) Cutting

4. Discussion

Coconut Pulp (*Cocos nucifera*)

Coconut pulp is a by-product of coconut milk production (Figure 1). The utilization of coconut pulp remains limited, primarily for animal feed, but it can also be processed into tempe menjes, a food product commonly found in rural areas of East Java Province [5]. Coconut pulp can be further processed into flour and used as an ingredient in various food products. Additionally, processing coconut pulp into tempe menjes serves to increase its economic value and preserve the local wisdom of Ketapang village residents. Utilizing coconut pulp as feed can partially replace more expensive tempe ingredients, thereby reducing production costs and increasing profits [6].

The nutritional content of coconut pulp includes 5.78% protein, 38.24% fat, and 15.07% crude fiber [7]. It also contains anti-nutritional compounds, such as 61% galactomannan, 26% mannan, and 16% cellulose. The high fiber content in coconut pulp, used as a food product in tempe menjes, provides health benefits by promoting digestion and preventing constipation [8].

Tofu Pulp (Glycine max)

Tofu pulp is a solid by-product generated during the tofu production process (Figure 2). Tofu, a food product made from soybeans, serves as the main raw material in tofu production. Despite being a by-product, tofu pulp still contains significant nutritional value, including protein (17.72%), fat (2.62%), carbohydrates (66.24%), phosphorus (0.29%), calcium (0.19%), iron (0.04%), and water (0.09%) [9]. Therefore, it can still be utilized as a primary or supplementary ingredient in the processing of certain food products. The protein content of tofu pulp remains consistent regardless of its moisture condition, with 29.00% protein content in wet pulp and 27.98% in dry pulp [10].

The Indonesian community frequently repurposes tofu pulp as a food ingredient, animal feed, agricultural material, and even as a floor cleaner. When tofu pulp is reprocessed into a food ingredient, it undergoes further fermentation, resulting in tempe menjes, which is consumed as a supplementary food product. Although tofu pulp can be utilized, it also poses negative potential impacts, such as contributing to environmental pollution and having low economic value [10]. However, tofu pulp can still be beneficial if managed properly, as demonstrated by the residents of Ketapang village, who use tofu pulp as a raw material for producing tempe menjes. This practice not only utilizes waste but also enhances the economic and cultural value of the local community.

Mold (Rhizopus sp.)

Mold is a multicellular fungus that possesses mycelium or filaments, and its growth on food is easily observable, appearing as white cotton-like formations [11]. Mold is widely used as a fermentation agent in food production due to its benefits, such as increasing protein, vitamin, and mineral content, as well as enhancing the flavor and aroma of food products [12]. The fermentation process in tempe menjes production occurs through the activity of Rhizopus oligosporus (Figure 3). This fermentation helps eliminate the beany odor from soybeans. The mold involved in tempe fermentation does not produce toxins; in fact, it is capable of protecting tempe from aflatoxin contamination.

After 48 hours of incubation, the mold colonies begin to change color to grayish-brown after more than 72 hours, indicating a relationship between the grayish-brown conidia of the mold and tempe menjes. Sine & Soetarto [13] reported that Rhizopus oligosporus and Rhizopus oryzae have conidia with grayish-brown coloration. The growth of tempe mold is rapid, as it typically covers the entire petri dish within approximately 48 hours. Hernawati & Meylani [14] observed that mold from various commercial tempe brands showed that the inoculum used is from the Rhizopus genus, which exhibits grayish-brown conidia, similar to Rhizopus oligosporus.

Production Process

The production of tempe menjes is conducted using straightforward methods and simple tools (Figure 4). Initially, coconut pulp and tofu pulp are thoroughly mixed and then washed until clean to reduce any residual acidity. To maintain its quality, tofu pulp should be processed within three days. The washed pulp is then placed into a sack and pressed using a hydraulic press until all the water is completely extracted. The material is subsequently ground using a sieve, transferred into a steamer, and steamed for approximately 45 minutes over a stove. Typically, one steamer is used to process around 15 kg of tempe menjes ingredients. The steamed pulps are left to cool before being inoculated with mold (kapang) mixed with water. Generally, five packages of mold are used, depending on the amount of pulp to be processed. The inoculation process is performed using a sieve again to ensure the even distribution of mold. The mixture is then molded and left to ferment for approximately three days before being cut into the desired size. The production of tempe menjes is carried out daily, typically processing up to three sacks of pulp each day. Tempe menjes that is not suitable for consumption can be identified by its yellowish color, which indicates the presence of toxins, and its bitter or sour taste. The processed tempe menjes is then distributed by the residents of Ketapang Village to nearby markets, and some of it is further processed into fried snacks that are highly favored by the community [15]

5. CONCLUSION

Based on the research results, it can be concluded that the people of Ketapang village utilize coconut and tofu pulps processed into food ingredients with economic value, namely

tempe menjes. Coconut and tofu pulps are rich in beneficial content for health. *Tempe menjes* production also utilizes mold for the fermentation process and has been produced since the 1990s. The production process includes mixing, pressing, sieving, steaming, mold inoculation, molding, and cutting. The production is distributed to nearby markets and further processed into other food products.

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