



Ethnoscience Study of the Making of Traditional Uwi Kaju Ndota and Alu Ndene Food in Ende Regency

Veronika P. Sinta Mbia Wae^{1*}, Melania Priska¹, Maimunah H. Daud¹

¹Department of Biology Education, University of Flores, Ende, Indonesia.

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Corresponding Author:

Veronika P. Sinta Mbia Wae

veronikasmwae04@gmail.com

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Abstract: Uwikajundota and alundene are local wisdom based on traditional food whose existence has experienced a shift due to developments over time. Uwikajundota and alundene are traditional foods made from cassava. This research aims to explore scientific concepts in the processing process through an ethnoscience approach. This research is a type of qualitative descriptive research. The location of this research is in Nanganesa village, Ndona District, Ende Regency. The subject of this research is Nanganesa Village while the object is ethnoscience in making the traditional food uwukajundota and alundene. The sampling technique uses purposive sampling. Research data comes from primary data and secondary data. Primary data was obtained from interviews with residents who process uwikajundota and alundene as well as observations regarding the manufacturing process. Secondary data was obtained from literature studies related to theory and other supporting data. Data analysis was carried out through several stages, namely collection, reduction, presentation, and conclusion. The research results show that the stages of making the traditional food uwikajundota and alundene have the potential to be used as a science learning resource. As a science learning resource, the manufacture of uwikajundota and alundene can be studied in several concepts, namely food nutrition, additives, force and pressure, and thermodynamics.

Keywords: AluNdene; Cassava; Ende; Ethnoscience; UwiKajuNdota

Introduction

Ende Regency is a district located on Flores Island, East Nusa Tenggara Province which is known for its cultural diversity. This can be seen in people's daily lives which include clothing, food, and shelter as well as other aspects such as dance, songs, and local traditions which are still maintained today. The various cultural diversity found in various fields characterizes the identity of Ende Regency. Apart from cultural diversity, Ende district also has abundant natural resources in the field of local food. One type of local food that replaces rice is cassava (Hidayat et al., 2023; Kartika & Fajri, 2021).

Apart from being boiled and fried, cassava in Ende district is also processed into uwi kaju ndota and alu

ndene. Uwi kaju ndota and alu ndene are traditional foods whose existence has experienced a shift due to developments over time. In line with current developments, the level of public awareness of local food knowledge is decreasing due to the influx of foreign food (instant food) which dominates local culture and wisdom. Cultural diversity needs to be introduced as early as possible to increase the feeling of love for one's nation and country, especially love for one's region so that the existence of local culture and wisdom is maintained (Rahman, 2023; Siregar et al., 2021).

Knowledge of local wisdom has been passed down from generation to generation from the older generation to the younger generation so the possibility of it being

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lost is very large due to the lack of documentation about it (Febrian, 2023; Listantia & Sarjan, 2023; Wae et al., 2022). So that the existence of culture and local wisdom (local food) can be maintained, it is integrated into cultural knowledge, especially in the learning process so that it can improve a person's learning experience from cognitive, affective, and psychomotor aspects. These three aspects are an innovation in the world of education that combines elements of culture with science (Chasani & Fakhruddin, 2023).

Meaningful learning can be obtained if learning involves a real environment, especially a place to live around because from there students can analyze a problem faced by the surrounding environment (Effendi & Muliadi, 2023; Mulatsih et al., 2023; Nurrubi et al., 2022). The combination of cultural elements with science can be studied through ethnoscience studies (Solheri et al., 2022). Ethnoscience is a science that studies the renewal of the relationship between the local wisdom of an ethnicity or tribe (original community knowledge) into scientific science (Putri et al., 2022; Sanova et al., 2023; Silla et al., 2023). Ethnoscience studies on traditional cassava-based foods in Ende Regency are still relatively limited. Therefore, this research will make an important contribution to expanding our knowledge about the practices, cultural values, and socio-economic impacts of this traditional food.

Method

This research is a type of qualitative descriptive research, which describes a situation or phenomenon in the form of narrative sentences, and conclusions are drawn. Information and research data obtained from direct observation.

The location of this research is in Nanganesa village, Ndonga District, Ende Regency. The subject of this research is Nanganesa Village while the object is ethnoscience in making the traditional food uwi kaju ndota and alu ndene. The sampling technique uses purposive sampling and snowball sampling.

Research data comes from primary data and secondary data. Primary data was obtained from interviews with residents who process uwikajundota and alundene as well as observations regarding the manufacturing process. Secondary data was obtained from literature studies related to theory and other supporting data, such as research journals as reference materials from researchers, books, and author documenting ongoing activities.

Research data was collected through, *Observation*. The author will make observations using documentation to reveal related facts. So the author makes observations and participates directly in making uwi kaju ndota and alu ndene. *Interviews*. Interviews were conducted to find

out the steps for making uwi kaju ndota and alu ndene. Interviews were conducted with residents who process uwi kaju ndota and alu ndene, sellers, and residents who consume them, and 3) Documentation. The function of documentation is that the author can record all information from the resource person from the object to be studied.

Data analysis was carried out through several stages, namely *Data reduction*, this step is carried out by focusing on the important things from the data that has obtained. This process has been going since observations and interviews until data is collected, *Data display*, namely in research qualitative descriptive, data presentation is done in the form of sentences, tables and pictures so that they are easier to understand, *Drawing*. conclusion or verification, this conclusion is new findings in the form of descriptions or images of objects that were previously unclear becomes clear (Rikizaputra et al., 2022).

Result and Discussion

Reconstruction of the Science of Making Uwi Kaju Ndota

Based on the research carried out, data was obtained on the community's original knowledge regarding the making of uwikajundota which was reconstructed into scientific knowledge. The reconstruction of the making of uwi kaju ndota into scientific knowledge goes through five stages, namely: *Cassava preparation*, at the preparation stage, the cassava is peeled until clean so that the dirt and cyanide contained in the skin are not carried away during the cooking process. After peeling, the outer part of the tuber is scraped to remove mucus and reduce cyanide levels which give cassava a bitter taste. The scraping process also aims to allow additional materials such as additives (salt and sugar) to penetrate.

Grating cassava, aims to soften the texture so that it damages the cell walls so that the starch inside can come out. *Squeezing/extraction*, aims to reduce the water content and starch contained in cassava. At this stage, grated cassava is added with 2-3 glasses of water while kneading so that the starch juice can come out. After kneading, filter the grated cassava using a clean cloth while continuing to water it until the juice becomes clear.

Adding grated coconut and salt, the addition of grated coconut and salt in the fourth stage aims to enhance the taste of the uwikajundota. The addition of grated coconut will give a savory taste to the food and help maintain the texture, while salt or sodium chloride (NaCl) functions as a flavoring in the food. Apart from functioning as a flavor enhancer, salt also functions to maintain quality and extend the shelf life of food (Titin, 2020).

Steaming, steaming is the final stage in making uwikajundota. At this stage, the steamer pan is lined with banana leaves to prevent the uwikajundota from sticking or sticking to the steamer and giving a distinctive aroma to the food. Apart from that, because banana leaves have a layer of wax on both surfaces of the leaves, they are waterproof. During the steaming process, the water vapor that rises to the top is held back by the wax layer so that only the heat is distributed to the food, resulting in the steamed food not being watery and cooked evenly.



Figure 1. *Uwi kaju ndota*

Reconstruction of the Science of Making Alu Ndene

The scientific reconstruction of alundene production consists of five stages, the process of deposition of cassava starch essence. In the deposition process, the cassava starch essence produced comes from the juice of grated cassava in the process of making uwikajundota. The juice from the grated cassava is collected in a container and settled. The sediment from this juice is in the form of starch which will then be processed into alundene. The purpose of settling is to separate the components of water and paste. The water at the top of the sediment is separated and collected in another container, while the paste is taken to be dried.

Drying, in the drying stage, the paste is dried in the sun for 2-3 days. The drying process aims to reduce the water content in the pasta which can cause the emergence of microorganisms in the form of mold or fungi which can damage the quality of the flour. *Making alundene dough*, after obtaining alu flour (tapioca flour), the process of making the dough is then carried out by adding wheat flour and grated coconut. The purpose of adding wheat flour is to make the alundene chewy, while the addition of grated coconut aims to add flavor to the alundene. The addition of wheat flour and coconut also allows the dough to expand and become crispy (Chaniago et al., 2019).

Roasting, after getting the desired dough texture, the next stage is the cooking process by baking it on a frying pan that has been smeared with oil. Applying oil to the pan aims to prevent the dough from sticking when baked. Then the dough is flattened with a spoon so that

the dough becomes flat so that the cooking process is even. The alundene dough is spread evenly on the surface of the pan so that it becomes wide and flat. The wider the surface area of the dough, the faster the water evaporation process takes place. When heating occurs, the starch gelatinization process occurs and an elastic structure is formed. This causes the texture of the alundene to become chewier and crunchier; and Adding brown sugar. The addition of brown sugar at the last stage is optional (according to taste). Sugar is added during the roasting process to add a sweet taste to the alundene.

The Relationship between the Making of Uwi Kaju Ndota and Alu Ndene with the Concept of Science

Based on the stages of making uwikajundota and alundene above, several scientific concepts can be described as follows: Food nutrition; Additives; Force and pressure; Thermodynamics. The concept of nutrition examines the content of vitamins, nutrients, and food substances found in cassava, coconut, and palm sugar. Cassava tubers are a food ingredient with a high carbohydrate content after rice so they can be used as an alternative to rice. Apart from carbohydrates, cassava also contains protein, vitamins, fats, and minerals (Arief & Endriani, 2022; Laka & Wangge, 2018). Based on the results of proximate analysis of cassava starch including water content of 13.61%, ash content of 0.02-0.49%, the fat content of cassava starch 0.02-0.49%, the crude fiber content of cassava starch (0.023%), amylose content of cassava starch 13.6-27% (Polnaya et al., 2015).

Cassava also has a high carbohydrate (starch) content so it can be processed into flour (Kamsina et al., 2019; Lu et al., 2020; Richirose, 2023). The type of cassava used in this research is Nuabosi cassava which is a local commodity from the Ende district. Nuabosi cassava consists of two types, namely white cassava (uwikajuterigu) and yellow cassava (uwikajutelo). The inside of white cassava is white, similar to rice, with a dense texture. Meanwhile, the inside of yellow cassava is yellow with a chewier and more sticky texture (Priska et al., 2020).

Coconut flesh has a high oil content of approximately 33%, carbohydrates 15%, protein 3%, and high amino acids (Rethinam & Krishnakumar, 2022; Subagio, 2011). According to Layli et al. (2021), adding grated coconut, apart from adding taste, also increases the nutritional content of food. Palm sugar contains sucrose, glucose, and fructose and has a lower glycemic index than granulated sugar (cane sugar) which has a high glycemic index (Maryani et al., 2021; Singh et al., 2020). The glycemic index of palm sugar is in the medium category with a value of 62.47, so it is safe to use

as complementary sugar by diabetes mellitus patients (Astuti & Astuti, 2023; Swastini et al., 2017).

Additives are food additives that are added to food to improve the appearance enhance the taste and extend storage or preservative time. The function of additives is sweeteners, colorings, preservatives, and flavorings (Titin, 2020). Palm sugar is an additive that contains several types of organic acids. Organic acids play an important role in product characteristics such as providing a distinctive taste and aroma. Organic acids include pyroglutamic, malic, lactic, ascorbic, and acetic acids which can influence the taste and aroma of food (Saputra et al., 2015). Apart from palm sugar, salt is also used to enhance the taste of food. Salt (NaCl) is formed from sodium and chloride. Based on its shape, salt is divided into two types, namely crystal salt and fine salt. In the process of making the traditional food uwikajundota and alundene using fine salt.

Force and pressure is the third material studied in this research. Force is a pull or push that has a direction can cause change and can be measured. Based on its nature, force is divided into two, namely touch force (the point of action is directly in contact with the object) and non-touch force (the point of action is not directly in contact with the object). The friction force that occurs in the process of peeling cassava, grating cassava tubers, and coconut is an example of touch force (Lidi et al., 2022; Muhtar & Mahyudin, 2021). The grated sweet potato is then squeezed out of the water using a clean cloth.

This process interprets the pressure material. Squeezed grated cassava has better taste, texture, and aroma compared to unsqueezed cassava. When cassava is squeezed, the starch content decreases. Cassava starch, which contains a small amount of glucose, influences the distinctive taste of cassava. The reduction in cassava starch makes the cassava texture chewy due to the loss of glucose polymers which consist of amylose and amylopectin. Apart from that, pressing also reduces aromatic compounds in cassava such as aromatic hydrocarbons, aliphatic carboxy acids, and aliphatic carbonate compounds, thereby affecting the aroma of cassava.

The final material discusses thermodynamics. In making uwikajundota, heat transfer is applied in the steaming process. Steaming is a cooking process carried out using hot steam with a heating temperature of around 100°C for approximately 15 minutes (Rosiani et al., 2015). The steaming pan becomes hot because heat is transferred by conduction from the stove to the pan. The water in the pan boils and evaporates due to an increase in temperature due to receiving heat by convection (Hadilla et al., 2023). This results in the uwikajundota becoming perfectly cooked.

The thermodynamic concept in making alundene is applied at the drying stage of alu flour and roasting. At the stage of drying the alu flour in the sun, radiation heat transfer occurs, whereas direct heat transfer occurs without any intermediary (Utami et al., 2022). The drying process greatly influences the quality of the flour itself (Trisnowati et al., 2022). The final stage in making alundene is roasting. The heat and temperature transfer mechanism takes place as in the steaming process of uwikajundota. During the roasting process, the alundene is spread evenly over the surface of the pan which has been smeared with oil. The larger the surface area of the alundene, the expansion can occur due to the gelatinization process, namely the swelling of starch granules, and the formation of air cavities which is influenced by temperature so that water can evaporate (Chaniago et al., 2019). Sugar can be used as a softener and also has hygroscopic properties, meaning it binds and attracts water. Sugar has greater water-attracting properties than protein and carbohydrates, so that when forming dough sugar attracts water in the dough and inhibits protein coagulation and starch gelatinization. The greater the amount of palm sugar, the water content tends to increase (Yanti et al., 2021).

The roasting process is done over low heat so that the mixture cooks evenly. The presence of reducing sugars and amino acids in the ingredients during roasting causes the Maillard reaction to occur. The longer the roasting, the browner the resulting product will be due to the browning process. The reaction during heating will produce water or other volatile substances, such as sugar experiencing decomposition or caramelization, fat experiencing oxidation, and the decomposition of carbohydrates to produce water.

Conclusion

Based on the research results, it can be concluded that the stages of making the traditional food uwikajundota and alundene have the potential to be used as a science learning resource. As a science learning resource, the manufacture of uwikajundota and alundene can be studied in several concepts, namely food nutrition, additives, force and pressure, and thermodynamics.

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Conflicts of Interest

The authors declare no conflict of interest regarding the publication of this paper.

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