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Organoleptic Characteristics of Instant Uduk Rice with Different Types of Rice Varieties and Steaming Time

Azzahra Nur Shifa Pramesthi¹ and Ratna Yulistiani¹

¹Food Technology Department, Faculty of Engineering, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Surabaya, Indonesia

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CORRESPONDING AUTHOR

*E-mail: ratna.tp@upnjatim.ac.id

A B S T R A C T

Instant uduk rice is a quick-cooking rice product characterized by porous grains, allowing preparation within 3–5 minutes. The organoleptic properties of instant uduk rice are influenced by the type of rice variety and the gelatinization process during steaming. This study aimed to evaluate the effects of different rice varieties and steaming durations on the physicochemical and organoleptic characteristics of instant uduk rice. A factorial experiment was conducted using a completely randomized design (CRD) with two factors and two replications. Factor I was rice variety (IR 42, IR 64, and Sintanur), and Factor II was steaming time (20, 30, and 40 minutes). Organoleptic properties were assessed through a scoring test, and data were analyzed using Analysis of Variance (ANOVA). The results demonstrated that both rice variety and steaming duration significantly affected the organoleptic characteristics of instant uduk rice.

Contribution to Sustainable Development Goals (SDGs):

Goal 2: Zero Hunger

Goal 3: Good Health and Well-being

Goal 8: Decent Work and Economic Growth

Goal 11: Sustainable Cities and Communities

Goal 12: Responsible Consumption and Production

Goal 17: Partnerships for the Goals

1. INTRODUCTION

1.1. Research Background

Nasi uduk is a typical Indonesian food that is much loved by the Indonesian people it has a savory taste and is usually eaten together with supporting side dishes such as chili tempeh, stir-fried vermicelli, omelet and others. Rice cooked traditionally generally takes about 1 hour including preparation, using a rice cooker, with a cooking time of 20-30 minutes, while with a pressure cooker, the average cooking time is 5-15 minutes [1]. Nasi uduk has a short shelf life and a long cooking process, so an

alternative is needed, which is developed into instant nasi uduk [2].

Instant rice is rice that has undergone pre-cooking and gelatinization of starch to a certain level in water so that when serving, boiling water can be used so that the rehydration time is relatively short [1]. The rice variety of instant rice can affect organoleptic characteristics. One of the factors that determine the organoleptic quality, especially of rice, is the ratio between amylose content and amylopectin content [3]. Rice that contains high amylose when cooked produces firm rice and hard texture after cooling, on the other hand, low amylose content in rice will produce fluffy rice and soft texture. Sintanur rice is classified as low amylose rice (17.26 percent), IR 64 rice is classified as



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medium amylose rice (24.10 percent), and IR 42 rice is classified as high amylose rice (26.95 percent).

The cooking process with steaming can affect the organoleptic properties of instant uduk rice. The gelatinization process occurs during the steaming process. Steaming will cause the starch to be completely gelatinized and the water trapped in the starch will be absorbed into the starch. As a result, the formed product becomes more porous. The level of rehydration shows that the longer the steaming time carried out on the product, the rehydration power also tends to increase [4].

Instant rice processing generally begins with precooking and the rice is soaked until it turns translucent (gelatinization). The porosity of rice can be increased by steaming and freezing which can shorten the time needed for rehydration. The formation of porosity in starch granules will help the instant rice process through the re-gelatinization process during rehydration. Furthermore, the rice is dried to obtain dry rice grains that are porous, the formation of these pores is expected to make the rice absorb water or hot steam more quickly so that it cooks quickly [5].

1.2. Literature Review

Instant rice is characterized by rice grains that are made porous. A more porous structure will speed up the hot water that enters it when rehydrated. After rehydration, instant rice is expected to match regular rice in terms of flavor, aroma, and texture [6]. The processing stages of instant rice include washing and draining the rice, cooking, freezing, and drying. The quality of cooked rice is influenced by the rice variety, which determines the amylose and amylopectin content. Amylose content is related to the increase in the number of hydrophilic groups that can absorb more water so that rice with low amylose content will produce rice with fluffy properties and does not need a lot of water when cooking, while rice that has a high amylose content will be firm so that it requires a lot of water when cooking [7].

The cooking process during steaming causes the rice to change starch structure, physical properties, and chemical composition. When rice is cooked, the starch structure undergoes gelatinization, which is the process of swelling the starch granules due to the presence of water and heat. The starch granules will absorb water then expand and cause chaos in the crystals and are irreversible [8]. Perfect starch gelatinization affects the rehydration of rice. If the gelatinization of rice is perfect, the rehydration time will be shorter. The drying process causes changes in the physical and chemical properties of instant rice. Physical and organoleptic properties that change due to drying include grain-specific gravity, color, aroma, shape, and texture. Water that is bound during the processing process will be removed through the drying process, resulting in porous rice with a low specific gravity [9].

Rehydration is the ability of a material to absorb and capture water, where this ability is known by determining the rehydration ratio, which is the ratio between the weight difference of the material before and after brewing to the weight of the material before brewing [10].

1.3. Research Objective

This study aims to determine the effect of rice variety and steaming time on the organoleptic properties of instant nasi uduk..

2. MATERIALS AND METHODS

2.1. Material and Tools

The main raw material used in this research is rice with 3 varieties, namely IR 42, IR 64, and Sintanur. Other ingredients are pandan leaves, galangal, garlic, shallots, coconut milk, cloves, lemongrass, bay leaves, lime leaves, ginger, star anise, cardamom, and salt. Equipment used for processing includes a cabinet dryer, freezer, blender, steamer, stove, knife, digital scale, cutting board, bowl, and spoon.

2.2. Research Design and Implementation

The experimental design used was a complete randomized design with a factorial pattern consisting of 2 factors. Factor I was different types of rice varieties and factor II was steaming time. Organoleptic testing in this study used a scoring test. The data obtained will be analyzed using Analysis of Variance (ANOVA).

2.2.1 Production of Instant Uduk Rice

Mixing rice of 3 different varieties (IR 42, IR 64, Sintanur) with coconut milk, finely ground shallots and garlic, galangal, ginger, pandan leaves, lemongrass stalks, coconut milk, cloves, bay leaves, salt, lime leaves, star anise, and cardamom. Initial cooking is done for 7 minutes at 85 °C. Steaming the rice with the length of steaming according to the treatment (20 minutes, 30 minutes, and 40 minutes). The steamed rice was then frozen in a freezer at -5 °C with a freezing time of 24 hours. The frozen rice was then dried with a cabinet dryer at 60°C for 5 hours, resulting in instant uduk rice. The instant uduk rice was brewed with 100 °C hot water and sealed for 5 minutes.

3. RESULT AND DISCUSSION

3.1. Raw Material Analysis Result

Analysis of raw materials carried out on instant uduk rice includes moisture content, amylose content, amylopectin content, protein content, and fat content. The results of the raw material analysis can be seen in Table 1.

Table 1. Raw material analysis results

Analysis	IR 64	IR 42	Sintanur
Moisture content	12.14	10.96	10.47
Amylose content	24.25	27.19	17.31
Amylopectin content	51.38	50.98	55.70
Protein	6.56	6.64	5.42
Fat	0.26	0.37	0.16

The results of the analysis show that each rice variety produces different moisture content. This is due to the drying process after harvesting the grain, if the grain is stored and not dried immediately, it can affect the moisture content of the rice. Freshly harvested grain should be dried immediately because it still has a high moisture content. High water content causes respiration to run fast, inviting mold growth, germination and browning reactions that can have an impact on reducing grain quality [11].

The analysis showed that each rice variety produced different amylose and amylopectin levels. This is thought to be due to the length of rice storage. Rice will change storage and can affect the amylose content in rice [12].

The analysis results show that each rice variety produces different protein levels. This is due to different planting locations where the soil where rice is planted has different nitrogen content. Higher nitrogen elements cause higher protein content in rice. Nitrogen is absorbed by plant roots in the form of nitrate and ammonium, but this nitrate is immediately reduced to ammonium through enzymes containing nitrate and ammonium. molybdenum. If the nitrogen element is available more than other elements, it will produce higher protein [13].

The analysis showed that each rice variety produced a different fat content. This is due to differences in the shucking process of the rice used, resulting in lower fat content compared to the literature. The rice shucking process can reduce fat content. Shaving will increase storability because this process will remove the high-fat aleurone that is easily oxidized in cracked rice. The nutrient content of rice is affected by the shucking process. Long shucking time will reduce the nutrient content of cereals because the nutrients in the aleurone layer will be removed [14].

3.2. Sensory Analysis

Sensory analysis conducted on instant uduk rice includes texture, taste, color, and aroma. The results of the organoleptic analysis of instant uduk rice can be seen in Table 2.

Table 2. Results of organoleptic score analysis of instant uduk rice

Formulation	Texture	Flavor	Color	Aroma
A1B1	1.88	3.84	2.28	3.76
A1B2	2.20	3.96	2.40	3.60
A1B3	2.28	4.00	2.40	3.68
A2B1	1.92	3.88	2.56	3.96
A2B2	2.36	3.92	2.44	3.92
A2B3	3.12	3.84	2.44	3.68
A3B1	3.80	3.92	2.36	3.92
A3B2	4.12	4.20	2.24	3.88
A3B3	4.28	3.92	2.56	3.64

The analysis showed that the average texture value of instant uduk rice ranged from 1.88-4.28. Rice is categorized based on its amylose content, namely low amylose rice (<20%) such as the Sintanur variety, medium amylose rice (20-24%) such as Inpari 32, and high amylose rice (>25%) such as IR 42, IR 64, GH, Mentik Wangi, and Umbul [15]. Amylose content is related to the increase in the number of hydrophilic groups that can absorb more water so that rice with low amylose content will produce rice with fluffy properties and does not need a lot of water when cooking, while rice with high amylose content will be firm so that it requires a lot of water when cooking [7].

During the heating process, starch gelatinizes and more air cavities are formed. So during the rehydration process, more water is trapped in the cavity causing the rehydration rate to increase. High-temperature treatment, starch will gelatinize which results in the formation of cavities in the flake structure. The more starch that is gelatinized, the more air cavities are

formed. So that when rehydration occurs, more water is trapped in the cavity. This causes the rehydration rate to increase [15].

The results of the analysis showed that the average value of instant uduk rice taste ranged from 3.84 to 4.20, namely from very bland to very savory. The savory taste of instant nasi uduk comes from the addition of coconut milk and instant nasi uduk seasoning. Coconut milk has a fatty taste and is used as a flavoring that causes the dish to be savory. Coconut milk contains three main nutrients, namely fat by 88.30%, protein by 6.10%, and carbohydrates by 5.6% [16].

The results of the analysis showed that the average value of instant uduk rice color ranged from 2.24 to 2.56, namely very white to brownish white. White color in instant uduk rice This is because the color of the raw materials, namely rice and coconut milk, has a white color. White rice is rice grain (grain) that has been removed from the outer skin (hull), bran (bran), and bran (polish) through the process of breaking the outer skin (dehulling) and polishing process using a rice milling tool so that white rice is obtained [17].

The results of the analysis showed that the average value of instant uduk rice aroma ranged from 3.60 to 3.96, namely bland to very savory typical of spices. The savory aroma of instant nasi uduk comes from the seasoning of instant nasi uduk. The seasonings that affect the aroma are pandan leaves, lime leaves, garlic, and lemongrass. Pandan leaves can affect the aroma of instant nasi uduk because they contain phenyl-alanine amino acid derivative compounds. The distinctive aroma of fragrant pandanus is thought to be due to the presence of phenylalanine amino acid derivative compounds, namely 2-acetyl-1-pyrroline. Kaffir lime leaves (*Citrus hystrix*) are commonly used as a spice because they have a distinctive aroma caused by the content of citronellal. [18]. Garlic can affect the aroma of instant nasi uduk due to the active substance allisin which causes sulfur odor when mashed or sliced. [19].

4. CONCLUSION

Based on the results of the analysis, it is known that the treatment of rice varieties and steaming time on the organoleptic texture of instant uduk rice.

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