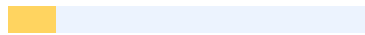




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The influence of preliminary treatment on cassava (*Manihot utilissima*) on the quality of analog rice produced

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Abstract. The ⁵ research of analog rice cassava has been conducted in the Laboratory of Food Processing Agricultural Polytechnic State of Payakumbuh, and the Laboratory of

Agricultural Technology Andalas University, Padang. Research conducted with the aim to search for materials that can shorten the fermentation time of cassava which is usually by natural fermentation, so as to produce analog rice with the best quality. The design used in this research is Complete Random Design (CRD) with 5 treatments and 3 replications. ⁴

One treatment as a control is cassava that is soaked naturally and 4 treatments with the addition of material in the form of curd, yeast of bread, yeast of tempe and yeast of tape.

Advanced test carried out by means ⁶ Duncan's New Multiple Range Test (DNMRT) on the real level of 5%. Based on the research that has been done the treatment chosen is the treatment with the addition of bread yeast in fermentation (C). The results of the chemical test of analog rice with the treatment of the addition of bread yeast (C) are : water content 13,42%, ash content of 0,75%, a protein content of 1,30%, a fat content of 4,53% and starch content 70,25%.

1. Introduction

Analog rice is one of the efforts to reduce dependence on one staple food and to vary food consumption. Analog rice using raw material source other than rice, but is derived from raw materials which contain other carbohydrates such as cassava, corn, taro, sago and others. Usually analog rice has a value of carbohydrates is approaching even exceeds that of rice.

In the process of analog rice manufacture with granulation derived from cassava through a process of immersion for a few days viewing of the age of the cassava used.

Immersion makes the process long and followed with the replacement ¹³ of the water every day as well as cause a bad odor.

Efforts to speed up the immersion process is performed by means of adding microbes such as curd, bread yeast, yeast of tempe and tape yeast. A variety of pretreatment in the research ² is expected to shorten the fermentation time and produces analog rice with good quality. The purpose of the research that has been done is to determine the effect of some pretreatment on the quality of analog rice that is produced.

2. Material and Methods

2.1. Time and place

This research has been conducted on the Labor of Food Processing Agricultural Polytechnic State of Payakumbuh, and Labor of Agricultural Technology Andalas University, Padang.

2.2. Materials and tools

The materials ¹ used in this research are cassava, filter cloth, cooking oil, curds, bread yeast, yeast of tempe and tape yeast. The tools used in this research are pan, stove, mortar, scales, a plastic container, cheese grater, tray, a cauldron and a spoon of fried.

2.3. Implementation of the research

1. Fresh cassava peeled, cleaned and inserted into a plastic container (basin)
2. The cassava is then soaked in clean water according to the treatment until the texture of the cassava is soft and dumped the water until dry.
3. The process continued with cassava grating that are not destroyed in ¹⁴ the process of soaking while destroyed cassava in the process of soaking directly done washing and the disposal of the pith of the cassava as well as rough fiber.
4. Crushed cassava is next pulverized ² with the use of wood to further smooth the texture of cassava. The next printed above the filter cloth or paper in bamboo tray. then analog rice that has been printed dried by the wind.
5. Further roasting by using as much oil as 10 ml/200 grams for 8 minutes. The rice is then dried under sunlight until dry.

2.4. Research observation

The observations made on the analog rice of cassava are : water content test, ash content test, protein content test, fat levels test and levels of starch test. The method of analysis as follows :

1. Water content [1]

Determination of water content was performed by the method of termogravimetri by using the oven

2. Ash content [1]

Determination of ash content was done by weighing the material remaining from the combustion of organic material

3. Protein content [1]

Determination of protein content determined by the method of Kjeldahl

4. Fat content [1]

The fat content is determined by extraction method using Soxhlet

5. Starch content [1]

Starch content determined by the method of Luff Schrool

3. Results and discussion

3.1. Water content

The results of the variety investigation showed that the treatment of addition of material in the form of curd, yeast of bread, yeast of tempe and yeast of tape in pretreatment in the manufacture of analog rice significantly affect to the water content (real level of 5%). This

can be seen in Table 1 below :

Table 1. The average of water content

Treatment

The average of water content

B (adding of curd)

14,35 a

D (adding of tempe)

13,56 b

C (adding of yeast of bread)

13,42 b

E (adding of tape)

13,04 c

A (Natural fermentation)

12,43 d

KK = 1,96%

Note: The numbers followed by the same small letters on the same row **6** and the same uppercase letters on the same line is not real different according to DNMR advanced test on real level of 5%.

From the table above it is seen that the **15** value of the highest water content value derived from treatment of the addition of curd (B) and the lowest from natural fermentation (A). Based on [2] **17** the water content of the rice is 14-15%, thus all treatments meet the quality standards of rice.

The water content of analog rice depends on the process of reduction of the water after fermentation. The process of water reduction is performed manually by pressing and the end limits to be printed. This value turned out to affect the water content of analog rice although it roasted to reduce the water content in the material. According to [4] that the longer of the cooking time, the water content of the material will decrease thus causing the evaporation of more water. This will cause the water content in the materials will be smaller. Evaporation is also caused due to the occurrence of the difference in vapor pressure between the **3** water on the material with water vapor in the air. **7** The water vapor pressure on the material in general is greater than the vapor pressure of water in the

air so that the occurring mass transfer of water from the material into the air.

3.2. Ash content

On the variety investigation showed that the treatment of the addition of curd, bread yeast, yeast of tempe, yeast tape on soaking cassava for the manufacturing of analog rice was real effect on ash content (the real level of 5%). 10 This can be seen on Table 2 below :

Table 2. The average of ash content

Treatments

The average of ash content

A (Natural Fermentation)

1,40 a

C (Adding of bread yeast)

1,01 ab

D (Adding of tempe yeast)

0,75 bc

B (adding of dadih)

0,72 bc

E (adding of tape yeast)

0,57 c

KK = 26,1%

Note: The numbers followed by the same small letters on the same row 6 and the same uppercase letters on the same line is not real different according to DNMRT advanced test on real level of 5%.

Based on [2] the value of the 1 ash content of analog rice is higher than rice of 0,19. This is due to the influence of different raw materials and the process of fermentation. The ash content of treatments are real different, value of ash content decreased with the addition of material in the form of tape yeast, curd, bread yeast and yeast of tempe when compared with the natural fermentation. 1 The results of the fermentation produced

organic acids in the form of lactic acid. The amount of lactic acid produced depends on the material which is added that of tape yeast, curd, bread yeast and yeast of tempe. 3 The amount of organic acid is inversely proportional to the ash content because the ash is inorganic material.

According to [9] ash is the inorganic substances remaining results of combustion of organic material. 8 Ash content and its composition in food material depending on the type of material and how its incineration. The ash content of a material is closely related to the mineral content of the material. Minerals 15 contained in a material can be a two kinds of salt, that organic salt and inorganic salt. Furthermore, according to the [8] on the fermentation time 96 hours, Lactobacillus plantarum is able to produce lactic acid by (0,895 % (wt/vol)) followed by tempe yeast(0,878 %(wt/vol)) and bread yeast (0,552% (wt/vol)).

3.3. Fat content

On the variety investigation showed that the treatment of the addition of curd, bread yeast, yeast of tempe, yeast tape on cassava fermentation for the manufacturing 2 of analog rice was real effect on fat content (the real level of 5%). 10 This can be seen on Table 3 below :

Table 3. The average content of fat

Treatments

The average of fat content

D (adding tempe)

5,53 a

E (adding of tape yeast)

5,11 b

C (adding of bread yeast)

4,53 c

B (adding of curd)

4,07 d

A (natural fermentation)

3,38 e

KK = 5,18%

Note: The numbers followed by the same small letters on the same row 6 and the same uppercase letters on the same line is not real different according to DNMRT advanced test on real level of 5%.

On the Table 3 above 1 can be seen that the fat content between treatments are mutually real different. Based on [2] the fat content of analog rice is higher than rice rice of 0,19.

This is caused by the addition of oil in the process of pre-gelatinization. The oil used 3 as much as 10 ml per 200 grams of the ingredients in the roasting in this research. High fat in the process of roasting will speed up the process of rancidity in storage so it is not worth consumed. This should be handled in the process of roasting lest too much. In addition, much oil not only speed up the damage but will also affect the visibility of the analog rice so that oily in the dry state. The difference of each treatment is caused by the absorption of the oil in 3 the process of roasting.

Oil absorption is influenced by the water content of the material. On roasting that uses heat to cause the water will evaporate and water position will be replaced by oil. According to [6] on the process of ripening takes place by the penetration of heat from the oil that goes into food. In this section the empty space that was initially filled by water will be filled by oil.

3.4. Protein content

On the variety investigation showed that the treatment of the addition of curd, bread yeast, yeast of tempe, yeast tape on cassava fermentation for the manufacturing 2 of analog rice was real effect on protein content (the real level of 5%). 10 This can be seen on Table

4 below :

Table 4. 16 The average of protein content

Treatments

The average of protein

E (adding of tape yeast)

1,30 a

C (adding of bread yeast)

1,29 a

D (adding of tempe yeast)

1,22 b

B (adding of curd)

1,21 bc

A (Natural Fermentation)

1,18 c

KK = 2,5%

Note: The numbers followed by the same small letters on the same row **6** and the same uppercase letters on the same line is not real different according to DNMRT advanced test on real level of 5%.

On the Table 4 above can be seen that **12** the protein content of analog rice is lower than the standard composition of sosoh rice namely 7,39 [3]. The low value is because the raw material used is a low **protein content of** cassava. The **15** value of the protein increased with the onset of the fermentation process a result of enzymes produced by microorganisms.

According to [7] the protein content is high **1** due to the ability of *Sacharomyces cerevisiae* and *Rhizopus oryzae* to secrete several enzymes of extracellular (protein) in cassava during the process of fermentation, or **the development of** *Sacharomyces cerevisiae* and *Rhizopus oryzae* in cassava in the form of single cell proteins during the fermentation process. The low protein on the analog rice can be coupled with other ingredients that contain carbohydrates such as beans. According to [3] analog rice is made from rice non rice plant with the content approach or exceed the rice and originated from a

combination of food materials.

3.5. Starch content

On the variety investigation showed that the treatment of the addition of curd, bread yeast, yeast of tempe, yeast tape on cassava fermentation for the manufacturing of analog rice was real effect on starch content (the real level of 5%). ¹⁰ This can be seen on Table 5 below :

Table 5. The average of starch

Treatments

The Average of starch

E (adding of tape yeast)

71,19 a

D (adding tempe yeast)

70,25 ab

C (penambahan bread yeast)

69,49 b

B (adding of curd)

68,15 c

A (natural fermentation)

67,40 d

KK = 0,82%

Note: The numbers followed by the same small letters on the same row ⁶ and the same uppercase letters on the same line is not real different according to DNMRT advanced test on real level of 5%.

¹ From the table above it is seen that the highest starch content is in the treatment of addition tape yeast (E), this happens because in the process of fermentation of cassava for 5 days the texture of cassava do not change that is still hard.

Hard texture occurred ⁷ because of the absence of erosion of the walls of cassava by

water which causes the number of starch dissolved in water immersion so that the starch is wasted. According to [9] starch is the carbohydrate which is a polymer of glucose, consists of amylose and amylopectin. The magnitude of the ratio of amylose and amylopectin varies depending on the type of starch. Amylose has the structure of straight bonds of (1,4)D-glycoside, is easily soluble in water because it contains a lot of hydroxyl groups. 1 Based on the standard sosoh rice the amount of carbohydrates in rice is 79,64 [3]

The amount of starch in the treatment is lower than the standard because on observations is the amount of starch which is the part of carbohydrates. But with this fermentation, the starch obtained already modified so it is more easily digested.

According to [5] starch modification is through a process of fermentation naturally or with the addition of microbes that help the fermentation process. In the fermentation process, the microbes will also produce enzymes that will hydrolyze the starch so that produced modified starch with similar characteristic with starch that modified by enzymes.

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