



The Effect of Gatot (Fermented Dried Cassava) and Red Bean Ratio on Water Content and Organoleptic Characteristics of the "Gatokaca" Analog Rice

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Abstract

This study aimed to evaluate the effect of the ratio of gatot and red beans usage on water content and organoleptic characteristics from "Gatokaca" analog rice. The material in this study was gatot (fermented cassava) and red beans. The experimental design used was a completely randomized design (CRD) with 4 treatments and 5 replications. This study consisted of 4 different analog rice formulations, namely T1 (90% gatot: 10% red beans); T2 (85% gatot: 15% red beans); T3 (80% gatot: 20% red beans); T4 (75% gatot: 25% red beans). Data were analysed using Analysis of Variance (ANOVA) with the significance level 5%. The results showed that the difference in the ratio of the usage of gatot but red beans didn't have a significant effect ($p > 0.05$) on the water content and organoleptic characteristics. Treatment with a ratio of gatot and 85% red beans 15% gatot was the best treatment.

Article information:

Received: 05 March 2019

Accepted: 01 May 2019

Available online:

02 May 2019

Keywords:

analog rice

gatot

red beans

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doi: 10.17728/jaft.4444

Introduction

Food is a complex matter, so many innovations with a specific purpose to create food that provides more benefits such as analog rice. Analog rice is artificial rice which has a form similar to rice, which can be made from local flour (non rice and non flour) (Budijanto and Yuliyanti, 2012). The technologies in making analog rice include granulation, cold extrusion, and hot extrusion methods. Other materials needed in the manufacture of analog rice include fiber or flour (starch containing fiber), water, lipids, binding or setting, and optional additives such as coloring, flavor, fortification, and antioxidants (Budi *et al.*, 2013).

Gatot is an Indonesian local product made from cassava which is spontaneously fermented by some Indonesians, especially in the Gunung Kidul area, Yogyakarta, which is characterized by the appearance of black on the outside and inside of cassava after approximately 1 month of drying (Yudiarti *et al.*, 2016). Fungi that are often found in Gatot are *Acremonium charticola* and *Rhizopus oryzae*, where *Acremonium charticola* contains probiotics and anti-oxidants which are claimed to be good for the health of digestive tract (Sugiharto *et al.*, 2016).

The processing of Gatot and red beans into analog

rice can reduce the consumption of rice in the society and also be used to support food diversification without making major changes in the tradition of consumers. Analog rice is designed to have a nutrient content that is almost the same or more than rice and has functional properties that are in accordance with the raw materials used.

Materials and Methods

The main ingredients used in the study of making "Gatokaca" analog rice were Gatot (fermented cassava), red beans and CMC. The equipments were basin, analytic balance (Excellent DJ Series), grinder, steaming pan, printer and drying oven.

Gatot Flour Making

Making Gatot flour was done with dried Gatot that was obtained from the producer in Gunung Kidul, Yogyakarta. Sieve was done by grinding and then sieved using 80 mesh sieves.

Making Red Bean Flour

Making red bean flour was done by red beans soaked in water with a ratio of 1:10 (w/v) for 24 hours, then steamed for 90 minutes, the steamed beans were

then dried in an oven at 50°C for 24 hours. The final stage of this process is size reduction using 80 mesh sieves

Making Analog Rice

Making analog rice in general is through several stages including formulation, pre-condition, printing and drying where all the main ingredients are Gatot flour, red bean flour, CMC, and water were mixed. The next stage was pre-condition, in the preconditioning stage. The mixing material was steamed for about 1 hour and maintained in warm conditions (temperature $\pm 70^\circ\text{C}$) and high humidity. The next stage was incubation at 50°C for 12 hours (Budi *et al.*, 2013)

Water content was measured using the method of AOAC (2005). The organoleptic parameters test were texture, aroma, black rice using ranking test method followed by the hedonic test (preference). As much as 25 untrained panelists were asked to provide their opinion by sorting numbers (based on the intensity of a particular attribute) and entering numbers (based on level favourite).

Data Analysis

Data was analysed using SPSS 16.0 at the significant level of 95% ($p \leq 0.05$). Analysis of data on protein content, crude fiber content, water content, bulk density used the Analysis of Variance (Anova) parametric test, then followed by Duncan's multiple test and non-parametric test (Kruskall Wallis) then followed by Mann Whitney's test.

Results and Discussion

Water Content

The water content of "Gatokaca" analog rice which can be seen in Table 1 was ranging from 4.7–5.2%, indicating that the use of different gatot and red bean had no significant effect ($p > 0.05$) on analog rice water content. This could be happen because the use of the same method in the process of making analog rice using drying process, so that the difference in treatment did not significantly influence the water content. This opinion is in accordance with Noviasari *et al.* (2013) which stated that analogous rice water used drying as process that might decrease the probability of fungal growth but it should follow the national standardization agency (SNI) No. 6128 in 2015 that water content in rice should be $\leq 14\%$ (Noviasari *et al.*, 2013; Loebis *et al.*, 2017)

The water content of "Gatokaca" analog rice could be affected by CMC. The lower water content provided stable and durable product, because the lower water content inhibited growth of fungi and mold (Zheng *et al.*, 2011). Based on Table 1, it can be seen that the water content of "Gatokaca" analog rice was lower than 5% generally. Thus, it meets the standart of water content in rice.

Organoleptic Characteristics

Based on Figure 1, it can be seen that the analog rice texture did not show a significant effect ($p > 0.05$) with a score range of 2.9–3.0. The organoleptic response was

comparable to the results of the measurement of water content where both of these parameters showed the similar statistic results. This may occur because of the use of CMC with the same concentration of 1%. CMC is a cellulose derivative that can be a stabilizer and binder (Lestriez *et al.*, 2007) and the greater the concentration of CMC decreased analog rice pores resulting high water absorption (Yuwono and Zulfiah, 2014). The most preferred texture was treatment T1.

Table 1. The Results of the analysis of water content of "Gatokaca" analog rice

Treatments	Mean \pm Standard Deviation
T1	5,14 \pm 0,166
T2	4,71 \pm 0,717
T3	5,16 \pm 0,316
T4	4,92 \pm 0,283

The aroma of analog rice produced according to the organoleptic test also had no significant effect ($p > 0.05$) with a score range of 2.8–3.0. The most preferred treatment for aroma was T1, this is presumably because the higher the addition of gatot, so the more unpleasant smell on red beans was covered (Riskiani *et al.*, 2014).

Based on Figure 1, the difference in the comparison of the use of gatot and red beans had no significant effect ($p > 0.05$) on the analog rice flavour. The range of scores produced ranged from 2.8 to 3.0. This opinion was supported by Noviasari *et al.* (2013) that taste of analog rice must be plain, so it could be consume with another food such as fish and vegetables. Furthermore, Yudiarti and Sugiharto (2016) stated that the growth of *Acremonium chorticola* fungi in the manufacture of gatot rose aromatic compounds. However, the growth of molds in fermentation needs to be controlled to avoid bitter taste. Cassava contains toxic component of hydrogen cyanide which gave bitter taste, but it can be reduced by heating, cutting, marinating, and frying (Feng *et al.* 2003). So, with the most preferred treatment in this study was T2.

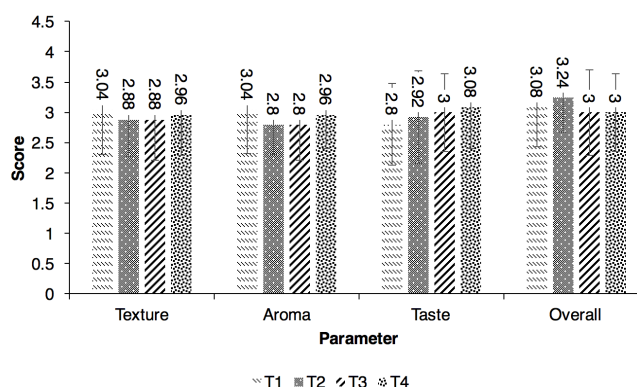


Figure 1. Hedonic test of "Gatokaca" analog rice

The overall level of preference for "Gatokaca" analog rice products was shown in Figure 1, where there was no significant effect ($p > 0.05$) on overall test with a score range of 3.0–3.24. This is presumably because the three factors described above, namely the texture, aroma and taste of the analog rice produced have led to the characteristics of rice in general so that the overall

preference level of the panelists leads to a positive value with the most preferred treatment was T2 treatment.

Conclusion

It showed that the analog rice produced had water content and organoleptic characteristics that meet the national criteria of rice and could be accepted by panelists. The best treatment was gatot as formulation of 85% with a mixture of red beans as much as 15%.

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