Plagiarism Checker X - Report

Originality Assessment

19%

Overall Similarity

Date: Apr 6, 2023
Matches: 505 / 2720 words
Sources: 23

Remarks: Low similarity detected, check with your supervisor if changes are required.

Verify Report:
Scan this QR Code

Characteristics of the Chemical Physical Properties of Cassava Flour Modification (Mocaf) with the Use of Blondo or Virgin Coconut Oil (VCO) Dregs

Harni M1, Putri S K1, Gusmalini1, Handayani T D1

1 Food Technology, Politeknik Pertanian Negeri Payakumbuh, 15 Jl Raya Negara Km 7 Tanjung Pati, Payakumbuh, 26271, Indonesia

Corresponding author's email address: mimiharni2009@gmail.com

Abstract. 1 Mocaf (Modified Cassava Flour) is a yam flour that has been modified by fermentation using Lactic Acid Bacteria (LAB) that is sold freely in the community. The use of blondo is expected to replace the use of LAB because it is from VCO that has not been utilized propely. The LAB used in the production is from the production of VCO by fermentation. The design used was conducted by using a Complete Randomized Design (RAL) with 5 treatments and 3 repetation, as mocaf control used BIMO bacteria. Advanced testing used the Duncan New Mutiple Range Test (DNMRT) at a real level of 5%. Observations on mocaf flour include, pH flour, WHC, swelling and whitish flour. The observation resulted in a pH value of mocaf 6.43-5.44, WHC mocaf 207.7-231.3%, swelling mocaf 551-1650.33% and whitish mocaf 90.77-91.68.

Keywords: mocaf, fermentation, blondo

1. Introduction

Mocaf (Modified Cassava Flour) is a flour from yam that has been adjusted using Lactic Acid Bacteria (LAB) so that the molecule becomes simple and easy to digest. This flour has properties that are close to wheat flour and it is expected to replace wheat in the community, especially for those who cannot consume gluten (gluten free). Currently mocaf flour has not been as public as expected because the processing is still simple and can be done by the community industry. The effort that needs to be done is socialization to the community about the benefits of using mocaf.

Mocaf is processed using Lactobacillus bacteria that are usually sold in liquid or powder form, making it easier to use them in the community. But this bacteria is difficult to find in

the market so it becomes an obstacle by the community in obtaining it. Therefore, alternative use of other ingredients that can be used as bacteria in the manufacture of mocaf need to be found, the material is blondo or Virgin Coconut Oil (VCO) dregs. Blondo VCO is a dreg produced in the manufacture of VCO. So far blondo has not been utilized optimally and cause problems because in a few days will give off a pungent odor. Mostly in community this dregs is only used as a livestock meal, although it still comprises a fairly great nutritional rate. According to [1] blondo contains 13.97% carbohydrates, 8.38% protein and 17. 17% fat. There are several methods in the manufacture of VCO, namely physical, chemical or enzymatic processing or (fermentation). But VCO dregs that can be used in the manufacture of mocaf are dregs from VCO by fermentation, According to [2] the rendering of fermented VCO is 25.4%. The dominant lactic acid bacteria are found in blondo, namely from the genus Lactobacillus sp and Streptococcus sp [3].

2. Material and Methods

2.1. Materials and Tools

In making mocaf the materials used are, yam with maturity of 9 to 12 months while the materials for analysis are old coconut, BIMO starter, 80% alcohol, HCl 25%, NaOH 45%, NaOH 2.5%, NH4OH, KI 5%, AgNO3 0.02 N aquades, pretolium benzene, selenium, concentrated sulfuric acid, NaOH 30%, boric acid 3%, conway indicator, sulfuric acid 0.025 N and filter paper

Equipment used in the soaking process yams are plastic containers using lids, basins, scales, while the tools for analysis is burette, aluminum cup, oven, fat gourd, erlemeyer, drop pipette, cup glass, water gaper, measuring glass, reverse cooler, spatula, measuring pumpkin, bucklet, kjeldahl flask and distillation device.

2.2. Implementation of research

This research has been carried out 3 stages, stage 1 is the manufacture of blondo which begins with the manufacture of VCO in fermentation. The fermentation process is carried

out for 3 days to get Lactobacillus [4]. Stage 2 the mocaf manufacturing uses BIMO starter as standard and comparison uses blondo from VCO with various concentrations. Stage 3 observations of the resulting mocaf include: flour pH, WHC (Water Holding Capacity), swelling, and flour whitish degree.

2.3. Design

The design used in the study was a Complete Random (RAL) with 5 treatments and 3 repeatation. Duncan's New Multiple Range Test (DNMRT) at 5% significance level to carry out further tests. Each of these treatments is as follows: without blondo (BIMO starter), blondo addition 5%, 10%, 15%, 20%.

3. Results and Discussion

3.1 pH Mocaf

The results of the variety for mocaf pH differ significantly at the 5% level. The data on the average pH of mocaf are in Table 1.

Table 1. Average pH of mocaf

Treatments	Average pH level of mocaf
A (Without the addition of blondo)	6.43a
B (5% blondo addition)	5.71 b
C (10% blondo addition)	5.64 b
D (15% blondo addition)	5.48 c
E (20% blondo addition)	5.44 c

Note: Numbers that are followed by the same lowercase letters in the same line and the

same uppercase letters in the same lane are not really different, according to the DNMRT follow-up test at the actual level of 5%.

In table 1 it appears that the highest pH value is derived from A (without the addition of mocaf). The treatment without the addition of mocaf is significantly different from the treatment with the addition of blondo. The pH value of mocaf is influenced by the amount of blondo added in making mocaf because the blondo used has been fermented for 3 days to get the Lactobacilus bacteria. In the study the pH of immersion water was measured to range from 5.45 to 4.32. In the table above it is seen with the more blondo added the lower the immersion pH. Mocaf pH between without the addition of blondo with the addition of each other was significantly different, while between the addition of blondo the treatment was significantly different, only treatment C and D. This happened because with an increase of 5% between treatments there was a difference in acidity but between treatments the differences were not significantly different. According to [5] the decrease in pH caused by hydrolysis of starch to glucose and organic acids, especially lactic acid so that the longer the fermentation, the more hydrolyzed starch and lactic acid formed so that the pH decreases. Furthermore, according to [6] in fermentation the more bacteria produce lactic acid, the higher the organic acids formed due to the activity of these bacteria. More organic acids will cause more H+ ions to be formed, so that the pH value will decrease. Lactic acid, citric acid and acetic acid will dissociate into H+ ions [7].

The effect of pH values on starch is in the addition of carbonyl (CO) and carboxyl groups (COOH). Carbonyl and carboxyl groups have a significant effect on the viscosity of the paste formed, as they have a significant effect on the amylose decomposition process. As the decomposition of

amylose increases, so does the formation of the paste and the value of its development amount decreases [8].

3.2 WHC (Water Holding Capacity) Mocaf

The treatment of adding blondo VCO to the immersion of cassava for the manufacture of

mocaf against WHC was not significantly different from each other at the 5% level of significance based on the variance test data. The average WHC value is in Table 2 below:

Table 2. Average WHC mocaf

Treatments	Average WHC mocaf (%)
E (20% blondo addition)	231.3 a
D (15% blondo addition)	226.5 a
C (10% blondo addition)	226.3 a
B (5% blondo addition)	223.7 a
A (Without the addition of blondo)	207.7 a

Note: Numbers that are followed by the same lowercase letters in the same line and the same uppercase letters in the same lane are not really different, according to the DNMRT follow-up test at the actual level of 5%.

In Table 2 upstairs, the WHC values of mocaf produced is not significantly different from one another between without the addition of blondo with the addition of blondo. But with the addition of blondo it is seen that the WHC value is increasing due to the lower pH. The WHC value increases with the increase in the amount of blondo added because the starch has been hydrolyzed by the addition of acidic blondo. According to [9] after hydrolyzed starch it will be easier to depolymerize marked by breaking up the main chain ties, causing shortening of chain length and decreasing molecular weight. There is a decrease in the weight of the starch molecule, indirectly, the size of the starch molecule becomes smaller. Water absorption increases if the size of the starch molecule is small which will make it easier for water to enter the starch molecule. According to [10], the breakdown of starch

granules that occur during fermentation will change the structure of the starch which was originally crystalline to be amorphous and porous so that with longer fermentation the changes that occur will be more and more. This causes the ability of starch to bind water to increase because water entering the material will be trapped in the porous part

The WHC value or water connective power is influenced by several factors, including: comparison of amylose and amylopectin, molecular weight of amylose and amylopectin, distribution of molecular weights, degree of branching, length of molecular branches outer amylopectin which can play a role in bonding [11].

3.2 Swelling mocaf

From the results of the test of the variety for swelling different significantly at the 5% level. The average value of swelling for all treatments can be seen in Table 3.

Table 3. Average mocaf swelling

Treatments	Average mocaf swelling (%)
E (20% blondo addition)	1650.33 a
D (15% blondo addition)	1412.33 a
C (10% blondo addition)	1329.33 a
B (5% blondo addition)	1289.33 a
A (Without the addition of blondo)	551 a

Note: Numbers that are followed by the same lowercase letters in the same line and the

same uppercase letters in the same lane are not really different, according to the DNMRT follow-up test at the actual level of 5%.

Based on Table 3 above it appears that the value of swelling differs significantly but it is not real differing between treatments. The highest value of swelling is the treatment of adding 20% blondo, because the bond of hydrogen in the starch weakens so that the water easily enters and the starch becomes inflated. According to [12] the expanding power increases with the increasing of acetic acid concentration. This happenes because the acid can cause hydrogen bonds of the acid in the starch to weaken, so that water easily enters the starch granules. The process can make the starch granule becomes larger and expands, this is because the starch granule will absorb water so that over time the starch becomes expanded so that swelling power increases.

The increasing concentration of lactic acid then the value of swelling power and the longer the hydrolysis time, causes the starch chain reduced and causes starch chains to tend to be shorter and easier to absorb water [13]. Furthermore [14] said that starch granules that absorb water will cause starch granules to swell and coincide so that the value of swelling power increase. The longer the hydrolysis will cause reduced amylose and increase amylopectin. Amylopectin has properties that tend to be insoluble in water, so that if the amylopectin content increases then more pasta is formed and swelling power will also rise.

3.4 Degrees Whitish Mocaf

The results of the test of the variety for whitish flour degrees is not really different significantly at the 5% level. The average data of whitish flour degree can be seen on Table 4.

Table 4. Average degree of flour whitish

Treatments	Average degree of flour whitish
E (20% blondo addition)	91.68a

D (15% blondo addition)

91.64a

C (10% blondo addition)

91.19a

B (5% blondo addition)

91.08a

A (Without the addition of blondo)

90.77a

Note: Numbers that are followed by the same lowercase letters in the same line and the same uppercase letters in the same lane are not really different, according to the DNMRT follow-up test at the actual level of 5%.

The highest degree of flour whitish is the treatment of adding 20% blondo (E), but between treatments it is not real different from each others. The fermentation treatment has reduced the color darkness of the flour but in the presence of the addition of blondo the whiter the flour produced. This happens because the acidic blondo will inhibit browning due to drying. According to [15] the existence of a fermentation process by yeast significantly decreases the level of darkness of flour. The addition of acidic blondo inhibits browning during drying, resulting in whiter flour. Furthermore, according to [16], organic acids such as citric acid are used to inhibit the browning reaction by lowering the pH. In addition it is supported by [17] the browning reaction is slowed down by a decrease in pH and the browning reaction can be said to be self-imposing because the pH decreases with the numbers of the basic amino acid groups.

4. Conclusion

From the research conducted it can be concluded that : 1) The use of blondo as a mocaf starter can further whiten the color of the flour produced, due to the inhibition of browning in the presence of acidic blondo. 2) Flour pH ranges from 6.43-5.44, WHC mocaf 207.7-231.3%, mocaf swelling 551-1650.33% and mocaf whitish 90.77-91.68.

5. References

[1] Haerani H 2010 Pemanfaatan limbah Virgin Coconut Oil (Blondo) Jurnal MKMI 6 (4) 244-248

[2] Mimi H 2008 Identifikasi proses dan karakteristik Virgin Coconut Oil (VCO) dari 5 metode pengolahan Tesis Teknologi Industri Pertanian Program Pasca sarjana Universitas Andalas Padang.

[3] Wenny S M 2008 Pemanfaatan blondo sebagai starter dalam pembuatan minuman probiotik. Tesis Teknologi Industri Pertanian Program Pascasarjana Universitas Andalas Padang.

[4] Judith H M 2015 Pemanfaatan blondo sebagai starter dalam pembuatan yoghurt Balai Industri dan Standarisasi Industri Manado 16 (1) 66-76.

[5] Achmad S, Wiwik S W, Yuli W and Fikri F 2008 Produksi Operasi Standar (POS) : Produksi mocaf berbasis klaster Fakultas Teknologi Pertanian Universitas Jember Jember.

[6] Yeni A, Rudi K and Aman S P 2015 Pengaruh variasi waktu fermentasi terhadap kadar laktosa, lemak, pH dan keasaman pada susu sapi yang difermentasi menjadi yogurt. Jurnal Kimia Mulawarman 12(2) 97-100

[7] Widodo W, Naimatun M and Indratiningsih I 2015 Produksi low calorie sweet bio-yoghurt dengan penambahan ekstrak daun stevia (Stevia rebaudiana) sebagai pengganti gula Agritech 35(4) 464-473.

[8] Ronald P W, Berend C A V, Pieter H B and Thomas A W 2004 Oxidation of starch United States Patent no 6. 777. 548. B1.

[9] Novita S D, Nur H R P, Akhmad R A 2012 Karakteristik sifat fisikokimia tepung bengkuang (Pachyrhizus erosus) dimodifikasi secara asetilasi dengan variasi konsentrasi

asam asetat selama perendaman Jurnal Teknologi Hasil Pertanian V (2) 104-112. https://doi.org/10.20961/jthp.v0i0.13014

[10] Bankole Y O, Tanimola O A, Odunukan R O, Samuel D O 2013 An assessment of the functional properties, proximate composition sensory evaluation and rheological value of gari fortified with bambara groundnut flour (Voandzeia subterranean thouars) International letters of National Science 1 (17) 17-17 http://dx.doi.org/10.18052/www.scipress.com/ILNS.1.17

[11] Nur A, Gunawan W and Budi S 2016 Sifat fisik, kimia, dan fungsional tepung jagung yang diproses melalui fermentasi. Jurnal Agritech 36 (2) 160-169. https://doi.org/10.22146/agritech.12860

[12] Novita D S, Nur H R P, Akhmad R. 2012. Karakteristik sifat fisikokimia tepung bengkuang (Pachyrhizus Erosus) dimodifikasi secara asetilasi dengan variasi konsentrasi asam asetat selama perendaman. Jurnal Teknologi Hasil Pertanian. V (2). 104-112. https://doi.org/10.20961/jthp.v0i0.13014

[13] Siswo S and Isti P 2015 Pengembangan proses Modifikasi Cassava dengan hidrolisa asam laktat dan UV untuk substitusi terigu dalam produk pangan. Jurnal Metana 11 (2) 27-32. https://doi.org/10.14710/metana.v11i02.14755

[14] He J A 2005 Effects of ozonation and addition of amino acids on properties of rice starches A Dissertation Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College.

[15] Ukwuru M U, Egbonu S E 2013 Recent development in cassava based products research Academia Journal of Food Research 1(1) 1-13 DOI: http://dx.doi.org/10.15413/ajfr.2012.0105

[16] Radha I and Arthur J Mc E 1992 Anti browning agents : alternatives to the use of sulfite in foods Trends in Food Science & Technology Elsevier Journal (3) 60-64. https://doi.org/10.1016/0924-2244(92)90131-F

[17] De Man J M 1997 Kimia Makanan Penerbit ITB press Bandung.

Sources

1	https://ui.adsabs.harvard.edu/abs/2022E&ES.1059a2065H/abstract INTERNET 7%
2	http://tpa.fateta.unand.ac.id/index.php/JTPA/article/view/151 INTERNET 2%
3	https://biologyreader.com/starch-gelatinization.html INTERNET 1%
4	https://www.tutorialspoint.com/check-if-lowercase-and-uppercase-characters-are-in-same-order-in-python INTERNET 1%
5	https://quizlet.com/496043359/ap-chemistry-acids-and-bases-flash-cards/ INTERNET 1%
6	https://ejournal2.undip.ac.id/index.php/jatp/article/download/2714/2515 INTERNET 1%
7	http://repository.unand.ac.id/12769/ INTERNET <1%
8	https://slcc.pressbooks.pub/technicalwritingatslcc/chapter/4-writing-the-materials-and-methods-methodology-section/ INTERNET <1%
9	https://jurnal.fp.unila.ac.id/index.php/ABE/article/view/5985 INTERNET <1%
10	https://www.scirp.org/(S(351jmbntvnsjt1aadkposzje))/reference/referencespapers.aspx?referenceid=1268061 INTERNET <1%
11	https://www.researchgate.net/figure/Average-degree-of-flour-whitish_tbl1_362189911 INTERNET <1%
12	https://pubmed.ncbi.nlm.nih.gov/31858810/ INTERNET <1%
13	https://agris.fao.org/agris-search/search.do?recordID=CH2019300580 INTERNET <1%
14	https://scholar.google.com/citations?user=Z3rM76QAAAAJ INTERNET <1%

15	https://idalamat.com/alamat/80118/kantorpos-tanjung-pati-kabupaten-lima-puluh-kota-sumatera-barat INTERNET <1%
16	https://garuda.kemdikbud.go.id/documents/detail/1671661 INTERNET <1%
17	https://www.statisticsdonewrong.com/significant-differences.html INTERNET <1%
18	https://en.wikipedia.org/wiki/Starch_gelatinization INTERNET <1%
19	https://www.tandfonline.com/doi/pdf/10.1080/10942912.2017.1283326 INTERNET <1%
20	https://www.scribbr.com/category/methodology/ INTERNET <1%
21	https://cravingsinamsterdam.com/the-effect-of-water-on-starch-granules/ INTERNET <1%
22	https://www.sciencedirect.com/journal/trends-in-food-science-and-technology INTERNET <1%
23	https://www.researchgate.net/figure/The-waste-of-kalandues-shell-is-seen-to-be-mounting-and-has-not-been-utilized-optimally_fig1_331708288 INTERNET <1%

EXCLUDE CUSTOM MATCHES	ON
EXCLUDE QUOTES	ON
EXCLUDE BIBLIOGRAPHY	ON