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STUDY ON THE METHOD OF DESTRUCTION AND THE USE OF NATRIUM BISULFITE IN THE PROCESS OF MAKING GANYONG STARCH

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ABSTRACT

Utilization of ganyong in the form of starch is done as an effort to accelerate the realization of food stabilization program. Ganyong starch used as raw material or addition in making various food. This preliminary study aims to determine the appropriate method of bulps destruction to produce a high yield of starch, the amount of natrium bisulfite used to produce the best degree of white starch and starch quality based on its chemical properties. Preliminary experimental research was conducted with 2 stages, namely starch extraction stage and bleaching stage ganyong starch and starch quality test based on chemical properties (carbohydrate, protein, fat, crude fiber, amylose, ash water). The results of this study showed that the yield of ganyong starch by grated higher than milled, the use of natrium bisulfite with 1% concentration gave good result and the chemical test result of optimal ganyong starch was protein 0,04%, fat 0,53%, ash 1.43%, water 6.83%, starch 75.53%, amylose 35.20%, crude fiber 1.03%. It is expected that the method of manufacture can increase the production and quality of ganyong starch so that it can be utilized further to make various kinds of processed starch based ganyong.

KEYWORDS: *Bulbs, Sodium Bisulfite, Ganyong Starch*

1. Introduction

The pattern of consumption of staple food for most Indonesian people in fact raises the problem of food insecurity. The cause of the increase in population is not followed by an increase in rice production. Ironically, the amount of agricultural land decreases by 30,000 ha/year in Java and 10,000 ha/year outside Java (www.suarapembaharuan.com/News/23-06-2001). This fact can be used as the basis for the acceleration of the realization of food security stabilization program to overcome the dependency problem on one main subject which has been declared by the Ministry of Agriculture based on PP 68/2002. This effort can be done by using ganyong (Canna edulis) which is rich in fiber and superior in terms of mineral (Phosphorus, 70 mg) compared to other bulps, namely suweg, gembili, gadung, potato, sukun and tales (Nio, 1992). High fiber content precisely suitable to be processed into starch flour ganyong. The first step of the change of ganyong bulps into intermediate products in the form of flour and starch has been done by BKP and FTP UNEJ 92001) and Widowati (www.puslittan.bogor.net/Publish/Berita Puslit/BP19-10-2001). The results showed that ganyong starch had carbohydrate nutrient composition, ie 84.34%, protein 0.44%, fat 6, 43%, crude fiber, 0.040%, amylose 28%, water 7.42%, ash 1.37% Another form of this ganyong was able to increase its economic value to 10 times the price of fresh bulbs which only Rp 300/kg. so that it is parallel to other food.

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In its development, starch ganyong has been used as raw material in various forms of processed food, such as pastries, cakes, crackers. The new form of processed ganyong into various preserved forms that have a distinctive and long-lasting stored taste is done by Sri Nurmala in the framework of non-rice food security (www.pikiran- rakyat.com, 14-6-2005). The processed form of ganyong in the form of fresh ganyong noodles has also been developed by Indrawati and Pangesthi (2007). In this study fresh ganyong noodles made from composite flour (mixture of flour and starch flour ganyong) with treatment proportion (%) 70:30; 40:60; 50:50 and the use of soda ash. (%) by the amount of 0.5; 0.75; 1 of total weight of flour. The results of organoleptic tests showed the best fresh ganyong noodles derived from the proportion of 70:30 composite flour and soda ash 0.75.

Making other ganyong noodles in dried form has also been done by Aksan Mashuri (2009) with the product name Nyong Noodles. Nyong Noodles made from dried ganyong starch result from fresh ganyong and then squeezed to be taken away and dried into flour. Making Nyong Noodles done by boiling ganyong starch flour into a similar porridge to be dried on a banana leaf to dry. Noodles will be obtained by tearing banana leaves with the size according to taste (Gemari 98th Edition/Year X/March 2009).

The new form of processed food based on ganyong is enough to prove the ability of starch ganyong can be used as a substitution of flour. The optimal substitution function will only occur if the ganyong starch processing technology is done appropriately. Therefore, the technology needs to be mastered, because it will support the availability of more processed food for the community.

During this time the making of ganyong starch done traditionally. Performed by small-scale home industries and the timing of production depends on the availability of raw materials. The process of making starch ganyong that is not terstandart cause the quality of starch results less than the maximum. In addition to the amount of erratic production, the quality is low because it has a dull color unlike other types of flour. Therefore, it is necessary to find a method of making starch ganyong which produces ganyong starch which has the maximum white degree with the addition of sodium bisulfite and proven by chemical test to ganyong starch which result is optimal, covering protein, fat, ash, water, starch and coarse fiber.

2. METHODS

This experimental research is the first step of the experiment of optimizing the use of ganyong starch in the manufacture of dry and intant noodles and various processed products. Phase I will produce ganyong starch. The procedure of making ganyong starch is done by three stages, namely starch extraction stage from ganyong bulps, bleaching stage of ganyong starch and starch production stage of ganyong.

2 1 Stage Extraction Stage

Ganyong starch is made from fresh ganyong bulps with extraction process. The process of extraction of starch is done by giving the treatment of different bulp destruction, that is grated and milled. Both methods become the variable to be studied. The result of extraction of ganyong tubers in the form of starch ganyong flour will be tested the quality of rendement.

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Table 1. Research Design of Starch Ganyong Extraction

Ganyong Bulp (X)	Method (Y)	
	Grated (Y1)	Milled (Y2)
White bulp	X.Y1	X.Y2

2 2 Phase Bleaching Ganyong Starch

The results of the best starch yielding test were followed up with the bleaching stage of ganyong starch. The bleaching process is carried out using sodium bisulfite. Determination of sodium bisulfite concentration is based on the maximum amount of use, ie 2% per kg of material per liter of water (Cahyadi, 2006). Thus the concentration applied as a bleaching treatment on ganyong starch flour is 1% and 2%. The result of bleaching of ganyong starch will be tested the quality in the form of white degree test.

Table 2. Research Design of Bleaching Powder Ganyong Starch

Optimal Bulb Demolition Method (X)	Natrium Bisulfit (Y) (Concentrations, expressed in% of total flour)		
	0 (Y1/Kontrol)	1 (Y2)	2 (Y3)
X	X.Y1	X.Y2	X.Y3

2 3 Chemical Test

White degree test results on the best ganyong starch flour followed by other starch quality measurements, namely: chemical properties (carbohydrate, protein, fat, crude fiber, amylose, ash and water).

Primary data collected in this research is ganyong starch yield, white starch flour, and chemical test. At this stage the data were collected by measuring the yield of starch ganyong and the measurement of white starch starch flour. These two data will be analyzed descriptively.

This research is carried out with the following procedure:

1) Preparation of test materials.
   Bulbs are cleaned from the skin and washed under running water to dissolve the mucus in water.
2) Starch extraction by grated and ground
   Tubing tubers were extracted separately by different tuber destruction methods, which were shredded (Sunanto, 1992) and ground (http://warintek.progressio.or.id/ttg/pangan/pati1.htm). The first way, begins with immersion ganyong bulps that have been cleaned into the water.Guyong bulps are grated to produce a soft slurry of ganyong. Ganyong soft porridge plus water with the same ratio and stand for 24 hours. The slurry is then wringed by hand and filtered by using properties to separate the starch from the dregs. The wet ganyong starch was then soaked in 0.1% sodium bisulfite solution (per kg of material / liters of water) for 30 minutes. Sheated powder will be discharged and replaced with fresh water. The soaking process of ganyong starch with water is repeated as much as 3 times. The filter sludge is dried in the sun to dry. The grains of dried starch are then milled and filtered with a 150 (150 g) sterile monol mesh.

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The second way, done by cutting the tubers that have been cleaned with a 2 cm dice size and soaked into the water. Bulbs ganyong milled to produce a soft porridge ganyong. Ganyong soft porridge plus water with the same ratio and let stand for 24 hours. The slurry is then squeezed by hand and filtered by using it to separate the starch from the dregs. The wet ganyong starch slurry was soaked in a 0.2% sodium bisulfite solution for 30 minutes. The pores that have been settled will be discharged and replaced with new water. The process of soaking the starch with water is repeated 3 times. Sludge precipitate dried in the sun to dry. The dried starch grains are then milled and filtered with a monel (gentle strimin) of 150 mesh.

3) Optimum Starch Ginger Testing
Optimum ganyong starch test was done by rendemen test. Rendement is the percentage of product yield on raw material (basic material). The rendement test is based on the extraction method.

4) Phase Bleaching Pour Flour Ganyong
The bleaching process is carried out using sodium bisulfite. Determination of sodium bisulfite concentration is based on the maximum amount of use, ie 2% per kg of material per liter of water (Cahyadi, 2006). Thus the concentration applied as a bleaching treatment on ganyong starch flour sre 1% and 2%.

5) Testing the degree of white ganyong starch
The result of bleaching of ganyong starch will be tested the quality in the form of white degree test with colorider method.

6) Testing Chemical properties
Testing of chemical properties are carbohydrate, protein, fat, crude fiber, amylose, ash and water.

3. RESULTS AND DISCUSSIONS

3 1. Results

In this study the yield of starch ganyong is produced from the production of ganyong bulps with two different methods, namely grated and milled. The yield of ganyong starch flour is shown in Table 3.

Table 3. Flour Rendement Data of Starch Ganyong (% / Kg of material)

Method	Result
Grated	22
Milled	19

The white degree indicates the degree of color that a material possesses. White degree test results with colorider method are shown in Table 4.

Table. 4. White Degrees Rating Data Ganyong starch

Natrium Bisulfit (%)	Result		
	Lightnes	Cromatis A	Cromatis B
0	71,6	10,7	12,0
1	72,1	10,2	11,4
2	72,1	10,8	12,1

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Chemical tests were performed on the optimal ganyong starch samples produced by the shredded method and the use of sodium bisulfite concentration (%) 1. The chemical test results can be seen in Table. 5.

Table 5. Chemical Flour Test Result of Ganyong Starch (%)

Sample	Analisis Results							
	Water	Ash	Kh	Protein	Fat	Starch	Amilosa	crude fiber
Optional Ganyong Starch	6,84	1,43	75,53	0,04	,53	75,53	36,29	1,03

3 2. Discussion

Based on Table 3. The ganyong starch produced by the shredded and grinded method gives different yield results. Starch ganyong produced from the scar method has a yield of 22% or 220 grams. This result is 15% higher than that produced by milled method, ie 19% or 190 gram.

The difference in outcomes of the two methods is not significantly different. These different results are due to the ganyong porridge produced by the scar method still looks fiber-shaped, so that the starch grains are still attached to the fiber. The existence of fiber actually helps separate starch granules (by its water soluble) when squeezed by squeezing. Conversely on the method of destruction of the tubers by grinding will produce a smooth porridge. To separate the portion of the pad must be wrung with a filter cloth with low fiber density. Filtering in this way precisely causes a lot of starch left on the fabric fibers, so that the resulting starch becomes less. These results conclude that the extraction of starch from the most optimal ganyong tubers is done by the shredded method.

In the implementation of this research, the actual method of optimizing the extraction process found is not limited only to the method of tuber destruction, but also to the treatment of starch precipitation. In the early stages of starch extraction trials, the process of separating starch by means of squeezing is done after tuber destruction. Starch produced only reached 10% of the total 1 kg net bulb.

Furthermore, the steps in the starch separation process were changed by giving the immersion treatment for 24 hours after the starch was destroyed. With this stage the resulting ganyong star increased twice as much as the previous one which reached 120%. This process is much more effective in removing the starch granules from the fiber part optimally. In this case the immersion process should not exceed the time limit, because it will affect the changes in the resulting starch aroma to acid.

The data of the colorider test results in Table 4. shows that the ganyong starch flour produced from the scar method with bleaching treatment using 1% sodium bisulfite and 2% shows the same value, that is 72.1. This value is not significantly different from ganyong starch without bleaching treatment, ie 71.6. So it is concluded that the treatment of sodium bisulfite between the concentration of 1 and 2% in the extraction process of ganyong bulps to improve the degree of white ganyong starch has reached the optimal value, that is 72.1 at 1% concentration.

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On the basis of health considerations in relation to the use of food additives to food products and white grades resulting from ganyong starch which was not significantly different (71.6), the recommended amount of sodium bisulfite usage from the results of this study, ie 1% was negligible . However, in the process of making ganyong starch is done by giving the treatment of soaking porridge ganyong solution for 24 hours and repetition treatment of sedimentation in a short time and washing more or at least three times. With this treatment will help dissolve phenol compounds as optimally as possible cause the decrease of white starchy flour starchy, because of its water-soluble nature.

The white degree of ganyong starch has lower yield compared to wheat reaching the value of 82.17 (BKP and FTP: 2002). The low degree of white starch ganyong caused by high phenol content which resulted in increased activity of phenolase enzyme causing brown color (Winarno, 1992). Phenol compounds contained in the mucus on the outside or inside the tuber tissue (Maklffoel, 1982). The solubility of phenol compounds in water is very high. With this nature phenol compound will be much lost in the process of starch processing, especially at the stage of starch washed and precipitated. Repetition done at this stage will provide benefits because the activity of polyphenolase enzyme becomes very low so as to reduce the effect of brown color on starch. Thus, the results of this study indicate that white degree improvement can be performed effectively on the process of starch extract from the ganyong bulp in two ways, namely to give immersion treatment for 24 hours after the starch is destroyed and the replacement of water during the process of precipitation repeatedly. With the treatment it gives the chance of phenol and mucilage compounds to dissolve and separate into clumps that float and settle on the top surface of starch.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusion

a. There is influence of ganyong tuber destroying method to increase yield of ganyong starch to 220g / kg fresh bulb.
b. There is influence of using sodium bisulfite 0,1% / kg of fresh ganyong bulp to increase of white degree value become 72,1.
c. Optimum ganyong starch chemical test results (%) are protein 0.04, fat 0.53, ash 1.43, water 6.83, starch 75.53, amylose 35.20, crude fiber 1.03.

4.2 Recommendations

It is expected that the method of manufacture can increase the production and quality of ganyong starch so that it can be utilized further to make various kinds of processed starch based ganyong.

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