

## **Tapioca quality observation based on physical and chemical properties of products**

**Safinta Nurindra Rahmadhia<sup>\*1</sup>, Wuryantoro<sup>2</sup>, Diah Ayuningtyas<sup>3</sup>**

*<sup>\*1,2,3</sup>Program Studi Teknologi Pangan, Fakultas Teknologi Industri, Universitas Ahmad Dahlan  
Jl. Ringroad Selatan, Tamanan, Banguntapan, Bantul. Daerah Istimewa Yogyakarta  
Corresponding author: [safinta.rahmadhia@tp.uad.ac.id](mailto:safinta.rahmadhia@tp.uad.ac.id)*

### **ABSTRACT**

PT Sinar Pematang Mulia, located in the Mataram Udik area, Central Lampung, is a company engaged in the tapioca flour industry with a production capacity of 500 tons/day. The purpose of the observation in this practical work is to determine whether the tapioca flour product of PT Sinar Pematang Mulia II is following the SNI for the quality of tapioca flour. The methods used include data collection and interviews. The analysis carried out as a determinant of the quality of the finished goods product is the analysis of water content, pH, retain a sample of 100 mesh, impurities mesh 325, SO<sub>2</sub>, ash content, starch content, whiteness, acid degree, and viscosity. Data were collected by analyzing for seven days and comparing the value of the analysis results with the standard of SNI tapioca flour and PerKBPOM no. 36 of 2013. It can be seen that in all the results of the analysis carried out, none of them exceeds the maximum limit.

**Keywords:** Cassava, tapioca flour, quality control

### **INTRODUCTION**

In Indonesia, cassava is the second largest agricultural food production after rice, so cassava has the potential as an important raw material for various food and industrial products. As human food, cassava has several deficiencies, including low protein and vitamins and unbalanced nutritional value. Cassava or cassava is one of the food sources of carbohydrates (a source of energy). Cassava in a new state does not last long. For marketing that takes a long time, cassava must be processed first into other forms that are more durable, such as cassava, tapioca (cassava flour), tapai, peuyeum, cassava chips, and others (Koswara, 2013). Tapioca flour is starch extracted with water from cassava tubers. Tapioca is widely used as a thickening agent, filler, and binder in the food industry (Astawan, 2009).

Supervision and quality control are essential factors for a company to maintain consistency of product quality, following market demands, so it is necessary to carry out quality control and supervision management for all production processes. Quality control and supervision must be carried out from the beginning of the production process to distribution channels to increase consumer confidence, improve product safety assurance, prevent many damaged products, and prevent wasted costs due to losses incurred (Junais et al., 2018).

Quality control of tapioca flour must be considered because if the tapioca flour is of good quality, the processed products produced by consumers will also get good results which will then have the effect of purchasing tapioca flour on an ongoing basis or continuously. In this study, tapioca flour's quality was examined and compared with the quality standards of tapioca flour, namely SNI 3451-2011, PerKBPOM no 36 of 2013, and the standards set by PT Sinar Pematang Mulia. Tapioca flour that does not meet the specified standards must be appropriately handled. This is very important to achieve a good and safe product for consumers.

## RESEARCH METHOD

The process of observing the quality of tapioca flour products at PT Sinar Pematang Mulia II was carried out for seven days with several testing parameters, namely water content, pH, retain sample 100 mesh, impurities mesh 325, SO<sub>2</sub>, ash content, starch content, whiteness, acid degree, and viscosity. This research was conducted for one month at PT Sinar Pematang Mulia II, Bandar Mataram District, Central Lampung. They collected data in this study through interview observations and literature study. The method of analysis carried out is to compare the results of the analysis using the standard quality requirements of SNI tapioca flour, PerKBPOM No. 36 of 2013, and the standards set by PT Sinar Pematang Mulia.

## RESULT AND DISCUSSION

According to the International Standardization Organization (ISO), to obtain quality standardization, a company must cooperate with the parties concerned through consulting experience, technology, and scientific results because the quality standards owned by an industry greatly affect the company's reputation, product accountability, and consumer trust. PT Sinar Pematang Mulia II carries out quality control to ensure the quality of tapioca flour for 24 hours. By conducting physical and chemical analysis and applying quality standards for tapioca flour products that refer to SNI 3451: 2011, PerKBPOM no 36 of 2013, and separate quality standards requested by consumers.

Data analysis was conducted to analyze the causes of the problem. Based on the formulation of the problem above, data was obtained during the implementation of the Practical Work at PT Sinar Pematang Mulia II, and the results can be analyzed. Problem-solving analysis on this problem is carried out by comparing the test results with the standards set by PT Sinar Pematang Mulia II. according to established standards.

Quality Control carries out quality control of Tapioca Flour at PT Sinar Pematang Mulia II based on comparing test results with Standards. The role of Quality Control is very influential on the quality of tapioca flour produced. Its main task is to monitor every production process, and if there is a problem with the quality of tapioca flour, you can directly contact the production staff for follow-up. The parameters used to determine the quality of the final product of tapioca flour are Water Content Test, pH, Retained On 100 mesh, Impurities 325 mesh, SO<sub>2</sub>, Ash Content, Starch Content, Acid Degree, Whiteness, and Viscosity. The tapioca flour samples were composite samples from 3 shifts (shift 1, shift 2, and shift 3).

Table I. Analysis of Tapioca Flour in 7 days

No.	Parameter	Average
1.	Water content (%)	12,53
2.	pH	5,67
3.	Retained 100 mesh (%)	0,98
4.	Impurities 325 mesh (%)	0,17
5.	SO <sub>2</sub> (mg/kg)	1,28
6.	Ash content (%)	0,10
7.	Starch content (%)	86,86
8.	Whiteness	92,42
9.	Viscosity (cp)	2657
10.	Acid degree (%)	0,1

Based on Table I. Shows that the results of the analysis of moisture content (Moisture Content) analysis of determining water content for seven days obtained the results that are 12.19%, 2.77%, 12.43%, 12.012%, 12.72%, 12.94 %, 12.64%. Based on the results obtained, it can be concluded that tapioca flour's water content follows the quality standard of tapioca flour products SNI 3451:2011 with a maximum water

content of 14%, as shown in Table I. According to research (Andarwulan et al., 2011), excess moisture content can cause a shorter shelf life of tapioca flour, and tapioca flour the higher the humidity and the more likely it is for mold to grow. The presence of water content in foodstuffs is often associated with food quality because it is used as a determinant of the stability index during storage. Food stability and quality are directly affected by water content (Sundari et al., 2015).

Analysis of pH determination for seven days obtained the results of 6.08, 5.62, 5.72, 5.71, 5.69, 5.76, and 5.08. Based on the results obtained, the pH value is still within safe limits. PT Sinar Pematang Mulia II has its pH standard to produce tapioca flour following the criteria desired by consumers; the pH ranges from 4.0 -7.0, as shown in Table 1. In the Indonesian National Standard (SNI 3451:2011), tapioca flour's pH value is not required. However, several institutions require that the pH value of tapioca flour is one of the factors to determine the quality of tapioca flour related to the processing process, namely the process of forming pasta (Pratama et al., 2018). Optimum gel formation occurs at a pH between 4-7 (Whistler et al., 1984).

Analysis of retained on 100 mesh for seven days obtained results of 0.89%, 0.96%, 0.71%, 1.00%, 0.90%, 1.38%, and 0.99%. The fineness of tapioca flour is also very important in determining the quality of tapioca flour. Tapioca flour of good quality is flour that does not clot and has a fineness between 90-100 mesh, although the SNI does not require the fineness of tapioca flour. PT Sinar Pematang Mulia II has its fineness standard to produce tapioca flour following the criteria desired by consumers and standards. The method obtains a minimum of 95% fine flour from the ingredients (the maximum coarse flour yield is 5% from the ingredients). Based on the results obtained, the retained 100 mesh test results are still within safe limits and following factory standards; the yield is less than 5%, as shown in Table I. According to research (Nurani et al., 2013), the coarser the flour particles, the lower the flour. Oil absorption rate. This can be caused by the coarser the flour particles or, the narrower the surface area of the particles, the less possibility of water that can be absorbed by the ingredients during dough making so that the product has a more porous and porous structure, less oil can be absorbed and trapped inside.

Analysis of the 325 mesh residue for seven days obtained the results of 0.17, 0.17, 0.14, 0.22, 0.15, 0.17, 0.14. PT Sinar Pematang Mulia II has its residue analysis standard to produce tapioca flour according to the criteria desired by consumers. The standard is to obtain refined tapioca flour with a maximum residue of 1%, as shown in Table I. Based on the results obtained, the results of the mesh residue analysis are still within safe limits and following factory standards; namely, the result is less than 1%. The analysis of the 325 mesh residue needs to be controlled because it will affect the fineness of the flour produced. According to (Nurani et al., 2013), the varying fineness of flour particles can be caused by differences in the processing process. In the processing of tapioca flour and corn starch, the flour product is obtained through the stages of the starch extraction process from the liquid by precipitation. The starch extract in the form of starch granules has a very fine particle size.

SO<sub>2</sub> analysis obtained a result that is 1.28. Based on the results obtained, the SO<sub>2</sub> value is still within the safe limits when compared to the quality standard of tapioca flour products PerKB POM no 36 of 2013 with a maximum SO<sub>2</sub> level of 70 ppm can be seen in Table I. SO<sub>2</sub> analysis was carried out to determine the SO<sub>2</sub> content of tapioca flour was within the safe limit or not. The form of SO<sub>2</sub> used is sulfur water. The added sulfur water serves as a preservative and maintains the whiteness of the resulting flour. According to research (Saputro, 2018), if the addition of sulfur is not appropriate, it is not following the Standard Operating Procedure (SOP) from the factory, it will have an impact on consumer health if consumed in the long term and smell produced will smell sulfur (SO<sub>2</sub>) or typical tapioca flour. If tapioca flour produced after the production process still smells (SO<sub>2</sub>), it can be ascertained that the mixture (SO<sub>2</sub>) added as tapioca flour bleach is not following the predetermined dose.

The analysis of ash content was carried out for seven days, and the results obtained were 0.09%, 0.10%, 0.11%, 0.09%, 0.11%, 0.09%, and 0.09%. Based on the results obtained, it can be concluded that the ash content of tapioca flour has met the quality standard of tapioca flour products SNI 3451:2011 with

a maximum ash content of 0.5% can be seen in Table 1. According to (Hamsah, 2013), the ash content of a food ingredient indicates the number of minerals contained in the food. Ash content describes the number of minerals that do not burn into volatile substances. Most food ingredients, namely 96%, consist of organic matter and water, and the rest consists of mineral elements, also known as inorganic substances or ash content. Ash content is mineral elements as a residue left after the material is burned until it is free of carbon. The higher the ash content, the worse the flour quality; the lower the ash content, the better the flour quality.

Starch content was analyzed using the starch hydrolysis method by breaking the starch polymer chain into dextrose units. The test was carried out for seven days and the results obtained were 86.86%, 86.87%, 86.78%, 86.87%, 86.88%, 86.89%, and 86.88%. Based on the results obtained, it can be concluded that the starch content of tapioca flour has met the quality standard of tapioca flour products SNI 3451:2011 with a minimum starch content of 75% seen in Table I. According to research (Wijana et al., 2009), the difference in starch content can be caused by various things: differences in the harvesting age of cassava, the type or variety of cassava planted, and technology for processing cassava into cassava. Cassava harvested at a relatively young age of fewer than seven months has lower starch content, while cassava harvested at planting age between 7-9 months will produce cassava with high starch content.

The whiteness analysis was carried out for seven days, and the results obtained were the color of pure white tapioca flour with values of 92.0%, 92.3%, 92.7%, 92.2%, 92.5%, 92.3%, and 93.0%. Based on the results obtained, it can be concluded that the whiteness of tapioca flour has met the quality standard of tapioca flour products SNI 3451:2011 with a minimum whiteness of 91% can be seen in Table I. The flour oven process also influences the color of tapioca flour. According to research (Ega & Lopulalan, 2015), it can be seen that heating HMT sago starch at a temperature of 100°C gives a lower whiteness value when compared to a heating temperature of 90°C. The increase in whiteness value in HMT sago starch by heating treatment at 90°C is thought to be influenced by low pH value, sago starch with heating treatment. This is usually also caused by the browning process on materials that contain carbohydrates. The high drying temperature causes the color of the flour to become darker due to the browning reaction. The quality of tapioca is determined by several factors, one of which is the white color of good tapioca flour (Mustafa, 2016).

The degree of acidity is the dissolution of the organic acids in the sample using a certain organic solvent (95% alcohol) followed by titration with a base (NaOH). Acid degree analysis conducted for seven days obtained the same result, 0.1. Based on the results obtained, it can be concluded that the degree of acidity of tapioca flour has met the quality standard of tapioca flour products SNI 3451:2011 with a maximum degree of acidity is 4% in Table 1. According to research (Suismono et al., 1989), the acidity of tapioca flour is likely. This is caused by the content of HCN, organic acids, and CO<sub>2</sub> due to starch reshuffle and fermentation.

Viscosity analysis was carried out for seven days; the results obtained were 2500 cp, 2800 cp, 2600 cp, 2700 cp, 2700 cp, 2700 cp, and 2600 cp. Based on the results obtained, it can be concluded that the tapioca viscosity has met the quality standards of PT Sinar Pematang Mulia tapioca flour products with a minimum viscosity of 1700 cp, which can be seen in Table 1. According to research (Ega & Lopulalan, 2015), it can be seen that the higher the temperature, the higher the temperature. When heating is carried out, the faster the sago starch becomes viscous and the lower its resistance to flow (viscosity), and vice versa, the lower the heating temperature, the longer the sago starch becomes viscous, meaning the higher the flow rate (viscosity). The quality of tapioca is determined by several factors, one of which is a high viscosity (viscosity) so that the adhesive power of tapioca remains high (Mustafa, 2016).

## CONCLUSION

The results of research and analysis concluded that the quality parameters of PT Sinar Pematang Mulia tapioca flour were water content, pH, flour fineness, residue or impurities, SO<sub>2</sub> content, ash content,

starch content, whiteness, acidity, and viscosity. Tapioca flour products at PT Sinar Pematang Mulia II follow SNI tapioca flour's quality requirements. Tapioca flour products at PT Sinar Pematang Mulia II follow PerKB POM No. 36 of 2013.

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