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Evaluation of the Potential of Ireng Gathering Starch (*Curcuma aeruginosa* Roxb.) As Alternative Food Ingredients and the Processed Organoleptic Aspects

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Abstract

The Curcuma aeruginosa is a plant of the Zingiberaceae tribe or ginger that has been known for its benefits as a traditional herbal medicine to overcome various health problems. But on the other hand, Ireng Intersection rhizome has reasonably high starch content. This study aims to measure the components of the chemical content in the Intersection of Curcuma aeruginosa frenetic characteristics of the processed pudding. The research method uses the standard proximate test, phytochemical test, toxicology test, and organoleptic test. Proximate test results showed that the irrigated starch contained 97.07% carbohydrates, 0.13% protein, 0.82% ash content, 1.98% fat, and 15.3% moisture content. The Toxicity test is not toxic. High starch content indicates that the Curcuma aeruginosa Intersection rhizome has the potential to be used as an alternative food ingredient. As many as 90% of respondents liked the Intersection Curcuma aeruginosa pudding, while for the aspect of taste 95% of respondents mentioned that the pudding was not sweet. As many as 91.67% of respondents did not detect the aroma of spices. As many as 93.33% of respondents agreed that there was no taste after consuming pudding. Pudding made from Intersection Ireng has the potential to be used as one of the variants of food.

Keywords: *Alternative food potential, Curcuma aeruginosa Roxb., Organoleptic, Processed Products*

INTRODUCTION

Curcuma aeruginosa is a ginger-tribal plant which has the characteristic of a black-blue cross-section of the rhizome. Ireng Intersection rhizomes are known to contain saponins, flavonoids, starch, fat, bitter substances, blue dyes, tannins, and polyphenols as well as essential oils of 0.3 - 2% (Syamsuhidayat and Hutapea, 1991, Gunawan et al., 1989). Ireng Intersection Rhizome is used as a traditional herbal medicine and anti-inflammatory (Reanmongkol et al., 2006) to treat coughs, asthma, and skin diseases (Nasrullah et al., 2010), antimicrobial (Angel et al., 2012), antifungal (Srivastava et al.) ., 2006), antioxidants (Choudhury et al., 2013; Nurcholis et al., 2015), anthelmintic (Siahaan et al., 2017), and antiandrogens (Srivilai et al., 2011). Ireng Intersection Rhizome is also developed in the biochemical industry such as soap (Sari and Cikta, 2016).

Ireng Intersection Rhizomes are now widely used in the world of medicine and the chemical industry. However, based on the writer's observation in Darupono Village, Kaliwungu District, Kendal Regency, Central Java, this rhizome is consumed by local residents as traditional food. The community utilizes starch contained in the Intersection Rhizome as a source of carbohydrates. The use of rhizomes as food is not new in the world of food processing. Traditional societies have long utilized rhizomes from various types of plants as foodstuffs such as canna (Harmayani, et.al., 2011), arrowroot (Ratnaningsih et.al., 2010), and temulawak (Khamidah et.al., 2017)

This study aims to determine the potential of Ireng Intersection rhizomes as alternative food ingredients by measuring the content of chemical components in the resulting starch, as well as testing the organoleptic aspects

of the processed products in the form of pudding. This research is expected to support efforts to diversify food in maintaining national food security.

MATERIALS AND METHODS

The material used for research was starch made from Intersection Ireng which was planted by the people of Darupono Village, Kaliwungu District, Kendal Regency. Making simple pudding based on Intersection Ireng requires starch meeting Curcuma aeruginosa, water, and sugar to boil in a ratio (1: 5: 1). Chemicals used for proximate testing include kjeltab (tablets containing K2SO4 and selenium), H2SO4, NaOH, ethanol, and benzene petroleum. The materials were obtained from the UNDIP Integrated Laboratory.

1. Proximate Test

Curcuma aeruginosa intersection starch that will be tested is made through a process of washing, grating, extortion, filtering, and drying. Proximate tests to calculate water content, ash content, fat content, protein content, and crude fiber respectively using the methods of SNI 2354.2-2015, SNI 01-2354.1-2006, SNI 2891 01 1992, SNI 01 2354.42006, and SNI 2891 01 1992 Carbohydrate content is calculated by the method of difference by subtracting 100% from the total percentage of ash, fat and protein content.

2. Organoleptic Test

The organoleptic test was carried out by a descriptive method to 60 untrained respondents consisting of 30 men and 30 women with an adult age range (20 to 45 years). Descriptive test in this study includes aspects of liking include likes or dislikes, aspects of taste include sweet or not sweet, aroma aspects include strong or no scent, aspects of texture include soft or ordinary, and aspects of after taste include no taste or no taste. The number of each respondent's choice is then calculated in percentage and presented in a graph.

3. Toxicity test

Toxicity tests are carried out to evaluate the effects and monitor the toxicity of a starch use from Curcuma aeruginosa as an alternative food ingredient will be consumed for a long time and repeatedly, because it is necessary to do a toxicity test. The purpose of this study was to determine the toxic effects of the test material on the hematology of Wistar rats. The study was conducted in accordance with the provisions of the toxicity test set by the Indonesian Food and Drug Administration (BPOM) on 120 Wistar rats (60 males, 60 females) for 90 days and 120 days (satellite). Rats were divided into 6 groups: I: Negative Control, II: low dose, III: middle dose, IV: high dose, Satellite Groups (V and VI) for 120 days: V: Negative Control Satellite, VI: High-dose satellite. The measured parameter is leukocyte, hemoglobin, MCH, MCHC, MCV, hematocrit, RBC, and platelet levels using a tool Hematology Analyzer with colorimetric principle.

RESULTS AND DISCUSSION

1. Proximate

The proximate analysis aims to determine the main components in a material. The main components of food that can be analyzed through proximate tests include total carbohydrates, water content, ash content, crude fiber content, fat content, and protein content. Proximate test also deals with the nutritional content of a food ingredient. Nutrition levels in food need to be known because it is directly related to food quality (Ensminger, 1994). The selection of Intersection is starch samples is based on the habits of the residents of Darupono Village, Kaliwungu District, Kendal Regency, Central Java who process Ireng Intersection into starch for consumption as traditional food. Data on proximate test results of Intersection are starch are presented in Table 1.

Table 1. Proximate analysis results of Intersection are starch

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Parameters	of Gathering ***Curcuma aeruginosa*** (% by weight)
Total carbohydrate levels	97.07
Moisture content	15.3
Ash content	0.82
Fat content	1.98
The protein content is	0.13
Crude fiber content	1.20

Based on table 1 proximate analysis results that the parameter results indicate the presence of Total carbohydrate levels, Moisture content, Ash content, Fat content, The protein content is, Crude fiber content and each will be explained as follows below.

Carbohydrate

The proximate analysis results of Intersection *Curcuma aeruginosa* show that carbohydrate is a component with the highest levels, reaching 97.07%. Carbohydrates are the primary source of calories and some carbohydrates can be in the form of fiber that is useful for the digestive system and has a vital role in determining the characteristics of food ingredients, such as taste, color, texture, and others (Winarno, 2008). The highest carbohydrate content of Intersection is starch compared to 85.60% mocap starch (Putri, et al, 2015), 80% rice flour, 77.3% wheat flour, and 56.5% sago flour (Hartati, 2003).

Protein

Proximate analysis of Intersection *Curcuma aeruginosa* protein levels showed 0.13%. This very low protein content from cassava starch is expected as food. The protein content of raw cassava pulp is very low and ranges between 1-3%.

Fat

The fat content of starch from Intersection Ireng is 1.98%. this figure shows that the starch is low in fat. This is in accordance with BPOM standards (2011) which states that the fat content of a product is said to be low in fat if the product contains fat with a maximum content of 3%.

Fiber

Proximate fiber test on irrigation Intersection starch was 1.2%. This figure shows that starch from Intersection *Curcuma aeruginosa* has low fiber content. The ideal crude fiber content of a food ingredient determined by the Food and Drug Supervisory Agency (2002) is 36%.

Water

Water content in food determines the freshness, acceptance, and durability of the foodstuff (Winarno, 2008). The higher the water content in a food, the greater the risk of damage. This is because biochemical reactions of food can take place through the media of water. Proximate analysts of the water content of Intersection *Curcuma aeruginosa* showed 15.3% results. The high water content is feared to make the shelf life of Ireng Intersection starch shorter and increase the risk of damage and contamination. According to Sutanto and Hp (2006), flour can avoid microbial growth and is stable when stored if the water content is less than 14%. The most optimal and effective condition for further processing without the risk of microorganism contamination is starch with a moisture content between 0-10%. The high water content of Ireng Intersection starch is probably caused by the lack of optimal starch drying process which is still done traditionally with the help of sunlight.

Ash

Ash is an inorganic residue that is obtained after the process of removing organic material contained in a material (Sudarmadji, et al., 1996). The results of the analysis of ash and Intersection *Curcuma aeruginosa* starch content of 0.83%, have met BPOM standards (2011) regarding food ingredients, which is a maximum of 4%. However, better quality, color, and texture are likely to be obtained if ash content can be reduced to a minimum as in potato starch Buckle, et al (1987). The maximum ash content of potato starch is 0.4% (Knight in Sartika, 2007).

The ash content in starch is minimal because it can affect the color and texture. Ash content can also correlate with food security in the form of flour. If the ash content is above 4%, then there may be minerals that can cause sedimentation in the kidneys that can interfere with health. High ash content can also be caused by contaminants in the test sample including physical impurities such as gravel, sand, and others (Aziz, et.al. 2015).

3. Organoleptic *Curcuma aeruginosa* Pudding

The organoleptic test in this study was carried out using the hedonic method. The panelists who did the hedonic testing totaled 60 untrained panelists, using 5 parameters, namely preferences, taste, aroma, texture, and after taste. Organoleptic test data analysis was done descriptively on positive and negative responses. Positive responses on each aspect in the form of like, sweet taste, the aroma of spices is not felt, soft texture, and without taste after taste. While the negative response is the opposite, that is not like it, the taste is less sweet, the aroma of spices is felt, ordinary texture, and the bitter sensation after taste. Organoleptic test results are presented in Figure 1 below

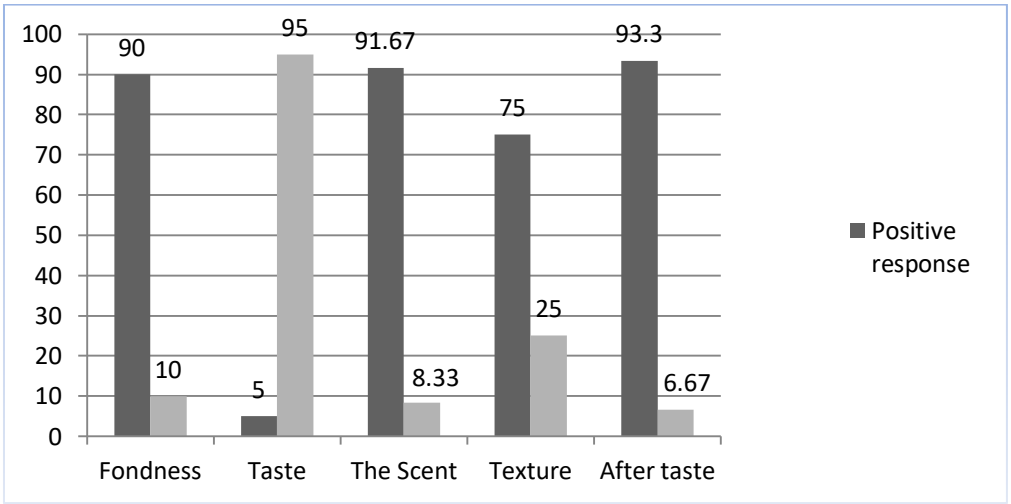

Figure 1: Organoleptic test of *Curcuma aeruginosa* pudding

Graph 1 shows that four of the five aspects of the organoleptic test obtained a positive response of ≥75%, namely preferences, texture, aroma, and after taste. The taste aspect received a negative response of 95%. The respondent stated that the pudding was not sweet enough. The taste of pudding that is less sweet can be tricked with additional ingredients. Organoleptic tests showed that the pudding from the Intersection is starch could be accepted as food preparation.

3. Toxicity test *Curcuma aeruginosa* starch

The results showed that the effect of the ingredients the test of all hematologic parameters did not differ from the control group ($p < 0.005$), In conclusion, the toxicity test of Curcuma aeruginosa starch is safe and non-toxic on hematology of Wistar rat blood Starch from Curcuma aeruginosa

CONCLUSION

Based on proximate tests of phytochemical analysis, toxicity test and organoleptic tests, Curcuma aeruginosa starch has the potential to be a viable and safe source of traditional local food which is expected to support food diversification efforts in maintaining national food security. *Curcuma aeruginosa* Intersection starch has good nutritional content and has the potential to be used as an alternative food ingredient. Processed *Curcuma aeruginosa* pudding can be accepted and preferred as processed food, but it is necessary to develop a processing method so that the taste of pudding can be accepted and the sensation after taste can be eliminated.

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