Nutritional Quality, Organoleptic Property, and Sensory Analysis of Rambutan (Nephalium lappaceum) Seed Flour

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ABSTRACT

Fruit seeds are thrown after consumption of the edible parts, making it less valuable and functional. Therefore the main goal of this study is to identify the nutritional quality, organoleptic property, and sensory analysis of potential flour from the seeds of a tropical fruit, rambutan. Nephalium lappaceum (rambutan) seeds are grounded to produce fine flour and subjected for nutritional quality analysis. For organoleptic property and sensory analysis, thirty respondents were given a sample for taste test of a composite cookie were rambutan flour was used as its main ingredient. A standard 9-point hedonic scoring scales to evaluate the rambutan cookie were utilized. Results showed that the rambutan seed flour has the lower moisture content, 8.07%, as compare to the ordinary wheat flour with an average of 12.67%. The analyzed ash content is 1.52% and crude fiber is 4.50%, which both contains a higher ash content and crude fiber than the average percentage content in wheat flour. Crude protein is 6.15% while total carbohydrate is 56.56% both content were lower than the average protein and carbohydrate content of the regular wheat flour. The analyzed crude fat of the rambutan seed flour was 4.50% higher than the average 0.98% of the regular wheat flour. Furthermore, an average of 8.5 hedonic score were obtained, depicting that respondents like the samples very much, in terms of appearance, taste, smell, texture, and overall quality.

Keywords: *Rambutan seed flour, nutritional quality, organoleptic property, sensory analysis*

INTRODUCTION

Rambutan (Nephelium lappaceum) is a fruit that can be found mostly in Asian countries, such as the Philippines. It is spherical in shape, having a usual colour of red, yellow, or orange (Chai et al., 2019), consisting of a seed, an edible white pulp, and a hairy rind (Nor, Syed, Rahman, Wahid, & Ab, 2015). Most fruits can be consumed fresh and they contain fats, varying amounts of protein, and a proportion of carbohydrate, starch, and sugar (Fila, Itam, & Johnson, 2013). Typically, people eat only the flesh, leaving the rinds and the seeds, not knowing that they can still be used as they also contain nutrients. In the study, the traditional method of processing rambutan seeds into flour is discussed, and its nutritional quality was further assessed. Although there are already several studies regarding the rambutan seed, other researchers focused on the defattening of its seed and used the fats as alternative cocoa butter. Therefore, the researchers have anchored on the flour itself in this project and will be conducting an organoleptic analysis on thirty random individuals, using a standardized questionnaire, the hedonic scale score, with the additional means of making a pastry product with rambutan seed flour as one of its primary ingredients.

Review of Literature

About 1.3 billion tons of food per year is lost or wasted. Out of all the commodities, fruits and vegetables represent 44% in the global food waste. In food industries, about 25-30% are in the form of pomace, peels, and seeds. The reduction of food waste may actually help the environment as it can lead to the decrease in emissions of greenhouse gases (Salim, 2017). It is relevant to consider using the rinds or seeds of a fruit, such as in rambutan, as they might also be beneficial for the people. In a study conducted by (Cheok et al., 2018), the peel of rambutan is being used as it contains antioxidants and anti-

proliferative properties. Moreover, it has been discovered that an oral administration of its extract can inhibit body weight gain. The percentage in utilization is greater in the peel (57%) than in the seed (43%), but it is not being outweighed as it still exhibits great effects in other researches like its antimicrobial activities against gram positive and gram negative bacteria such as Staphylococcus aureus and Escherichia coli (Bhat & Al-daihan, 2014).

Overproduction of rambutan is actually a problem as it easily loses moisture and darkens after a few days being harvested, leading to a large amount of waste (Nor et al., 2015). Similarly, in Central Java, Indonesia, rambutan has an economic potential that can help in increasing social welfare. The number of rambutan crop makes it abundant during harvest season, thus, it is sold cheap. However, the unsold fruits are left to just wither (Pujiati, 2016). This cycle prevents the goal of improving social welfare, not just in Indonesia, but might also happen in the Philippines. The usual management in fruit and vegetable waste is either, throwing them in landfills, feeding it to livestock, or using it as a compost (Hawkins, 2015). Instead of repeating that process, the utilization of the rambutan before it goes to waste gives an opportunity in constructing a business by developing strategies such as producing rambutan refined products like biscuits with the fruit's seed flour as alternative (Pujiati, 2016), which in time, might be successful for mass production, improving social welfare; and can mark the beginning of practicing economic sustainability.

Most of the studies regarding rambutan seed discusses how it can be an alternative to cocoa butter because it is made up of 33.4% fat (Solís-Fuentes, Camey-Ortíz, Hernández-Medel, Pérez-Mendoza, & Durán-de-Bazúa, 2010). However, the amount of fat ranges from 14-41% depending on the variety (Eiamwat, Wanlapa, & Kampruengdet, 2016). Methods such as fermentation and roasting treatment allows the separation of fat and it also contributes to waste management (Febrianto, 2013). However, in this study, the remaining part of the seed once the fats are removed is the one to be utilized, which is the flour. Other researchers defatten the seed by using carbon dioxide which controls the pressure and temperature to be exposed, removing a large percentage of fat (Eiamwat, Wanlapa, Sematong, & Reungpatthanapong, 2015). Thus, it could mean that by performing a simple method, most ofthe fat could still remain, but, in a study by (Azotea, 2014), even through the use of freeze drying technique, there was only a slight decrease in the fat content of rambutan seed flour. That is why, the flour acquired by traditional means is to be assessed for its nutritional quality. Still, due to the simplicity of the process of preparing rambutan flour, ordinary households can produce their own.

An example of the application of this rambutan-based flour will be the making of a pastry product. Simply boiled and oven-dried fluted pumpkin seeds that were ground to make flour were used as one of the ingredients in cookies and was found to have an increase in crude protein, calcium, potassium, and phosphorus(Giami, Achinewhu, & Ibaakee, 2005). Therefore, the rambutan seed flour might also exhibit a difference when it comes to the chemical aspect of food. In a study by (Eiamwat, Wanlapa, & Kampruengdet, 2016), it can also have an effect on the physical aspect of baked goods such as in its bulking density, swelling power, and absorption capacity, but for that to happen, the flour requires alkaline treatment.

Objectives of the Study

The study aims to utilize the non-edible part of rambutan, which is the seed, by performing a simple traditional method of extracting flour. Specifically, it aims to determine the nutritional content of the rambutan seed flour. Organoleptic property and sensory analysis of rambutan flour as well as the made cookie were also determine using a standard hedonic scale score.

METHODOLOGY

This study used a descriptive method of research. The researchers gathered 9.12 kg of rambutan fruit, which is considered non-marketable because of its sour taste. The seeds were dried using a turbo

broiler set at 120 degrees centigrade. After drying for two hours, the outer covering of the seed was removed and the seed was dried again using the same method for another hour. Lastly, the seed was then pulverized using a food processor.

The researchers went to University of the Philippines-Los Baños to test for the proximate analysis of flour. Afterwards, the rambutan seed flour (RSF) was used as the primary component of the pastry product. The measurement of the ingredients to make the dough were, 1 ¼ RSF, 5/8 sugar, ¼ butter, and 2 eggs. Then, the mixture, which was enough to make approximately 60 pieces of cookies, was baked using an oven, under 200 degrees Celsius for 15 minutes. After cooling, thirty random individuals were asked to taste the flour and the product for organoleptic property and sensory analysis, respectively. Subsequently, they were requested to answer the food product questionnaire using the standard, 9-point hedonic scoring scales.

Table 1. Measurement of ingredients

Ingredients	Weight(grams)	Percentage
Rambutan seed flour	160	38.28%
Sugar	70	16.75%
Butter	100	23.92%
Egg (2pcs.)	88	21.05%

Table 2. Standard 9-point Hedonic Scoring Scale

Characteristic	Rating								
Color/Shape	1	2	3	4	5	6	7	8	9
Taste/Flavor	1	2	3	4	5	6	7	8	9
Smell/Odor	1	2	3	4	5	6	7	8	9
Texture/Mouthfeel	1	2	3	4	5	6	7	8	9

RESULTS AND DISCUSSIONS

Nutritional Quality of Rambutan Seed Flour

Results show that the rambutan seed flour has the lower moisture content (8.07%) as compare to the ordinary wheat flour with an average of 12.67% moisture content. Lower moisture content in flour-based pastries needed more water and yeast to maintain its softness or natural flavour resulting to low shelf life of pastries (Giame and Ibaakii, 2005). Since the pastry products from rambutan seed flour has low shelf life, quick consumption for to maintain freshness was advise and to formulate a safe preservatives intended for non-grain flour made products.

The analyzed ash content is 1.52% and crude fiber is 4.50%, which both contain a higher ash content and crude fiber than the average percentage content in wheat flour. Crude protein is 6.15% while total carbohydrate is 56.56%. Both content were lower than the average protein and carbohydrates of the regular wheat flour. In contrast to the results, Azotea (2014) mentioned that the dicotyledon seeds contain more proteins but less carbohydrates compared to grains. Factors such as high temperature exposure and fine grinding may affect the total protein contents of the seeds (Eiamwat, J., Wanlapa, S., & Kampruengdet, S., 2016).

Table 3. Nutritional Quality of Rambutan Seed Flour

Properties (per 100 g)	Results	
	Proximate Composition of Wheat Flour (%)	Proximate Analysis of Rambutan Seed Flour (%)
Moisture Content	12.67±0.025	8.07±0.24
Ash	0.94±0.010	1.52±0.01
Crude Fat	0.94±0.006	4.50±0.21
Crude Protein	10.55±0.032	6.15±0.56
Crude Fiber	0.36±0.010	2.12±0.07
Total Carbohydrate (Nitrogen Free Extract)	74.88±0.508	55.56±0.19

The analyzed crude fat of the rambutan seed flour was 4.50% higher than the average 0.98% of the regular wheat flour. Naturally, a high fat content of rambutan seed gives the higher fat proximate results as compared to the wheat flour. Bhat, R. S., & Al-daihan, S., 2014, stated that the natural fat content of rambutan seeds contains high antioxidant properties similar of that of cocoa seed.

Organoleptic Property of Rambutan Seed Flour

The organoleptic property of rambutan seed flour is shown in Table 4. The acquired flour is yellowish in the form of a fine powder and gives off a bitter aftertaste. While, the respondents liked the smell of the flour extremely as it releases a pleasant odour similar to that of a baked good, but unlike the usual flour, the rambutan-based flour is a little rough in texture.

Table 4. Organoleptic property of rambutan seed flour

Characteristic	Average	Interpretation
Color/Shape	7.67	Like Moderately
Taste/Flavor	6.67	Like Slightly
Smell/Odor	8.33	Like Very Much
Texture/Mouthfeel	7.50	Like Moderately
General Acceptability	7.54	Like Moderately

Sensory Analysis of Rambutan Seed Flour

Table 5 exhibits the total and average of each characteristic that was evaluated by the respondents. The smell/odour of the food product garnered the highest percentage while the taste/flavour appeared to be the lowest. The overall average is 8.33, indicating that the respondents like the product very much, in terms of colour/shape, taste/flavour, smell/odour, texture/mouthfeel.

Table 5. Total and average score of the respondents' food product sensory evaluation

Characteristic	Average	Interpretation
Color/Shape	8.20	Like Very Much
Taste/Flavor	8.16	Like Very Much
Smell/Odor	8.56	Like Very Much
Texture/Mouthfeel	8.40	Like Very Much
General Acceptability	8.33	Like Very Much

CONCLUSIONS AND RECOMMENDATION

Traditionally, the researchers have obtained flour by utilizing the rambutan seed, which also helps in reducing food waste. Through the proximate analysis, the researchers have determined the nutritional quality of the rambutan seed flour having a moisture content of 8.07%, a crude protein is 6.15% and total carbohydrate of 56.56% both content were lower than the average protein and carbohydrates of the regular wheat flour. Crude fat of the rambutan seed flour was 4.50% higher than the average 0.98% of the regular wheat flour. Organoleptic property and sensory analysis were analysed through the participation of thirty answering the standard hedonic scale scoring techniques. An average of 7.66 (Like moderately) and 8.33 (Like very much), respectively, for its general acceptability, of both the flour and cookie product made of rambutan flour were analysed.

Since the fat content of rambutan flour varies from each variety, the researchers recommend to determine the variety that contain the least amount of fat as it can be important for the consumers who are concerned with their diet. For this, advanced techniques can be done to take out most of the fat, also, it would be better if there is a method to remove the bitter aftertaste of the flour in order to make it more marketable.

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