

Preference Level for Glutinous Corn and Sweet Corn as Local Food in Sigi Regency

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Abstract. Corn is widely used as feed especially poultry. Nevertheless, corn is also a source of local food that can be developed in a food diversification program. The nutrients contained in corn especially carbohydrates, are not inferior compared to rice. Types of corn which potential as local food include glutinous corn and sweet corn. As a local food material, it is necessary to know the level of user preference before it is widely developed. This study aims to determine the level of preference for glutinous corns and sweet corn as local food. The research was conducted in July 2020 in Sigi Regency. The method used is an organoleptic test namely a hedonic test or a preference test for white glutinous corn, purple glutinous corn, and yellow sweet corn. Data analysis was performed using one-way analysis of variance followed by the DMRT test. The results of the analysis showed that there was a significant difference in the color and flavor parameters, while in the texture and aroma parameters were not significantly different. Based on the results of further tests, purple glutinous corn and yellow sweet corn are preferred in terms of color and flavor, so they are recommended to be developed as local food materials in Sigi Regency.

1 Introduction

The strengthening program of food security prioritizes the utilization of local food in the local area. Local food is a food which grown in physical closeness to the consumer [1]. The local food is suitable in supporting food security because it is available in sufficient quantities and already adapted in the local area. Local food is the main material in the traditional food based on the traditional recipes for generations which consumed by people in specific regions. One of the potential local food commodities is corn [2,3]. This commodity has widely cultivated [4,5] and has potency to support food security [6,7]. However, generally corn varieties are used as animal feed especially poultry. The need of these kind of corns are massively increase

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in line with the increasing of population [8]. Therefore, the available varieties in the market are mostly corn for feed while not every variety is proper for directly human consumption. Some corn varieties are suitable for food and categorized as staple food [9], however some of corn varieties are categorized as horticulture such as sweet corn. Furthermore, people also process corn in the form of corn flour or cornstarch and corn oil [10] to get more benefits.

Local food has important role in diversify program as alternative source of carbohydrate and essential vitamins and mineral for human health [11]. Therefore, the nutrients content become consideration for corn as recommended daily food. Corn has many benefits based on its multi-nutritional content and functional inside [12]. Corn is a food that contains carbohydrates that have a low glycemic index, so it is good for health. The glycemic index of corn in the form of corn on the cob is 60 mg/g of ingredients. This value includes a moderate glycemic index value compared to the glycemic index content of white rice, which is 89 mg/g of ingredients which include high glycemic index ingredients. The results of the research by [13] showed that the results of measuring the glycemic response showed that boiled and stir-fried sweet corn had a glycemic index (GI) value of 41.22 and 31.08, respectively, and was included in the low GI food category. Baked sweet corn has a glycemic index of 55.31 and is included in the category of food with a medium GI. Furthermore, corn is the second cereal commodity as a producer of carbohydrates (75%) after rice and also contains high levels of protein (7–12%) so that it can be a good source of protein [14]. Corn also recommended as source of gluten-free diet [15].

A young corn, one of the types of sweet corn that people like the most, is usually consumed by the community in processed products such as boiled corn or roasted corn. Sweet corn is confirmed in its antioxidant content [16]. Sweet corn is one of food commodities which has a bright future since its superiority on sweet taste, soft texture, and high demand on the market. Therefore, sweet corn is recommended to be cultivated. Moreover, the sweet corn market is large, from traditional to modern market [17]. These become a reason a sweet corn as an alternative to be local food material since it is also already planted in Central Sulawesi.

One of other local foods material to be developed for food diversification in Central Sulawesi is glutinous corn. This commodity to be developed as local food because people already familiar with the taste, the nutrients contained especially carbohydrates which is not inferior to rice. In addition, the process of processing corn into ready-to-eat food is relatively easy and people are used to consuming it [18]. There are two kind of glutinous corn namely white glutinous corn and purple glutinous corn. The difference is mostly on the color and aroma.

There are some potential alternatives of corn as material for local food, therefore it is necessary to carry out the preference level by organoleptic tests. [10] wrote that organoleptic testing is an effective test, where this test is carried out to measure consumers' subjective attitudes towards products based on the properties of the product, such as color, aroma, texture, taste, acidity level, and viscosity level. The organoleptic also obtained the preference's grade of the product. Those properties are important as treatment to functional food [19]. Some researchers already studied about the importance of preferences about the development of local food materials, however the a study about glutinous and sweet corn has not be done yet [11]; [7]. Therefore, this study aims to determine the preference for color, taste, texture, and aroma of 3 types of corn namely white glutinous corn, purple glutinous corn, and yellow sweet corn.

2 Methodology

The research was carried out in July 2020 in Sigi Regency, Central Sulawesi Province Indonesia. The organoleptic test chosen in this study is the hedonic test or the preference test

which is one of the acceptance tests. Panelists are asked to write down the hedonic scale response on the form provided by putting a check mark in the box according to the impression they feel/assess. Respondents were 30 untrained respondents consisting of 15 women and 15 men. The requirements of respondents were purposively selected who are consumer of corn as local food and stay nearby in the research location. The person of respondents was randomly chosen. The organoleptic test on corn was conducted to characteristics namely color, flavor, aroma, and texture using a hedonic scoring scale.

Table 1. Test of organoleptic scale.

Hedonic scale	Numerical scale
Like very much	4
Like	3
Like moderately	2
Dislike	1

In this study, the main ingredients used were 3 types of corn, namely Purple Glutinous Corn, White Glutinous Corn, and Yellow Sweet Corn. Data analysis of organoleptic test was performed using one-way analysis of variance (ANOVA) with SPSS 21.0 program [20]. The difference between the mean of each treatment was determined by Duncan's test. P value or sig less than 0.05 ($p < 0.05$) was considered to have a statistically significant difference.

3 Result and Discussion

The characteristics respondents as factors which are determine the decision to choose local food and its materials [21]. Based on the research result, the panelists age is between 20 up to 51 years old, with education level from senior high school to post graduated. The income level of respondents is varied from 1,500,000 to 15,000,000 per month. The Sulawesi people are common to consume corn as local food especially for the local ethnicity. They usually consume it as meal between the main meals or process it to combine corn granule with the rice as main food.

The one-way analysis of variance (ANOVA) was employed to get preference the effect of color, flavor, aroma, texture preference on 3 types of corn, namely purple glutinous corn, white corn and yellow sweet corn.

3.1 Color



Fig.1. Scores of corn color.

The highest score for color is the purple glutinous corn followed by yellow sweet corn and white glutinous corn. The purple color look more attractive to the consumer compared to other color which are look plainer. The contrast of the color support the significantly different result in the Anova.

Table 2. Results of One-Way Anova Test on the color of 3 types of corn.

	Model	Sum of Squares	df	Mean Square	F	Sig.
Color	Between Groups	8.156	2	4.078	10.538	.000
	Within Groups	33.667	87	0.387		
	Total	41.822	89			

Based on Table 2, it can be explained that the level of preference for the color of 3 types of corn is significantly different, it is indicated by a significant level of 0.000 (smaller than 0.05). Based on this result the purple color is more attractive compared to the white and yellow color. From the results above, Duncan's test was carried out to determine the highest preference for the color of the 3 types of corn which is presented in Table 3.

Table 3. Duncan's Advanced Test Results on Color Preferences for 3 Types of Corn.

Type of corn	N	Subset for alpha = 0.05	
		1	2
White Glutinous Corn	30	2.7667 ^b	
Yellow Sweet Corn	30		3.2000 ^a

Based on Duncan's follow-up test, it can be seen that the preference for the color of white glutinous corn is significantly different from that of purple glutinous corn and yellow sweetcorn of white corn, the panelist prefers purple and yellow rice because purple and yellow are more attractive. Color is a main component for determining the level of acceptance of a food ingredient. The important of the color is proved by fact that even the taste of food considered as delicious and has a good texture, it will not be eaten if it has an unattractive or inappropriate color. Determining the quality of a food ingredient depends on several factors, but before other factors are visually considered, the color factor appears first to determine the quality of the food [22].

3.2 Flavor

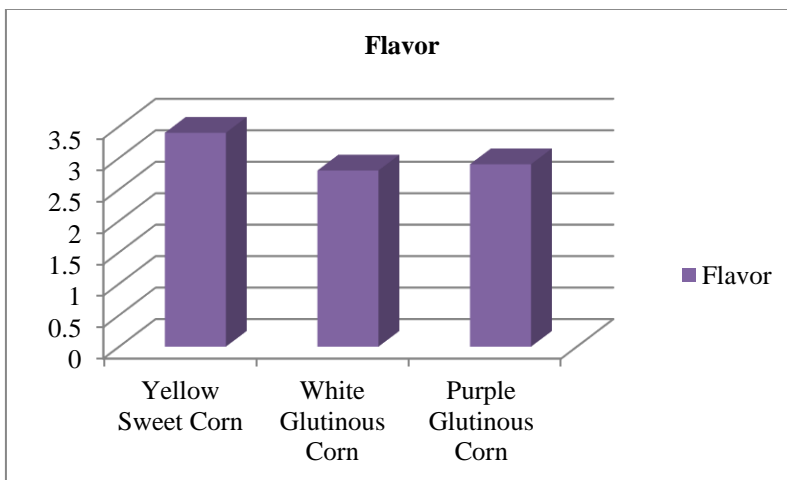


Fig.2. Scores of corn flavor.

The other factor which is also important in determining of consumer decision to accept or reject a food product is flavor. The consumer will reject a food if the flavor is not good even though other parameters are qualified. There are four basic tastes recognized by humans, namely salty, sour, sweet and bitter. While other flavors are a combination of other flavors.

The highest score for flavor is the yellow sweet corn followed by purple glutinous corn and white glutinous corn. The yellow sweet corn preferable in term of flavor because of the sweet taste of the corn. The sweet taste is natural and genetically and influenced by genetically characteristic [17]. The difference of the flavor supports the significantly different result in the Anova. The results of the one-way ANOVA test can be seen in Table 4.

Table 4. Results of One-Way Anova Test on the flavor of 3 types of corn.

Model		Sum of Squares	df	Mean Square	F	Sig.
Flavor	Between Groups	4.822	2	2.411	5.116	.008
	Within Groups	41	87	0.471		
	Total	45.822	89			

Based on table 4 above, it shows that the panelists' preference for taste has a significant (significant) effect, this is indicated by a significant level of 0.008 (<0.05), so Duncan's further test was carried out to find out the difference in taste preferences of each type of corn. The results of further tests on taste preferences for 3 types of corn are in table 5.

Table 5. Duncan's Advanced Test results on taste preferences for 3 types of corn.

Corn varieties	N	Subset for alpha = 0.05	
		1	2
White Glutinous Corn	30	2.8333 ^b	
Yellow Sweet Corn	30	2.9333 ^b	
Purple Glutinous Corn	30		3.3667 ^a

From the results of Duncan's further test, it can be seen that the preference for yellow rice corn is significantly different from purple corn and white rice. Panelists prefer yellow sweet corn, because the taste of yellow sweet corn is fresh and immediately tastes sweet on the first bite, while purple *pulut* is sweeter than white rice. This difference in taste is caused by differences in sensory sensitivity in feeling something. Differences in sensations that occur between two people can be caused by differences in the sensations received, due to differences in the sensitivity level of their sensory organs or due to lack of knowledge of certain tastes [22].

3.3 Aroma

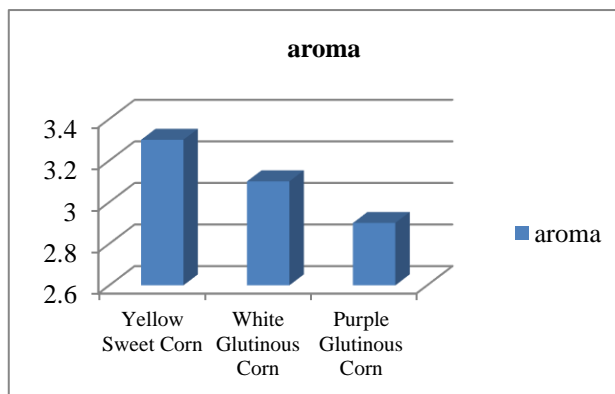


Fig. 3. Scores of corn aroma.

The highest score for aroma is the yellow sweet corn followed by white glutinous corn and purple glutinous corn. The results of the one-way ANOVA test are presented in table 6.

Table 6. One Way Anova Test results on the aroma of 3 types of corn.

	Model	Sum of Squares	df	Mean Square	F	Sig.
Aroma	Between Groups	.800	2	.400	1.000	.372
	Within Groups	34.800	87	.400		
	Total	35.600	89			

Based on table 6 above, it shows that the panelists' preference for aroma is not significantly different, this is indicated by a significant level of 0.372 (> 0.05). The three types of corn have a distinctive aroma, namely fragrant yellow sweet corn, white rice, and white rice. such as not emitting an odor (normal) and purple *pulut* has an unpleasant smell. The aroma come from the food is a forceful interest which could arouse the sense of smell therefore increase the appetite. The work of enzyme or without enzyme reaction support, it give a volatile compounds formation which are later emerge the aroma[23]. Furthermore, the aroma component is strictly related to its concentration in the vapor phase inside the mouth. The concentration is affected by the volatility of the aroma. Other factors are the natural interaction between aroma component and nutrition components such as carbohydrate, protein, and fat. Those three corns have different aroma influenced *bt* its level aroma components and nutrition's contain.

3.4 Texture

Texture is one of the properties of materials or products that can be felt by touching the skin or tasting. Texture is a very important property, both in fresh and processed foods. The texture and consistency of the ingredients will affect the taste of an ingredient.

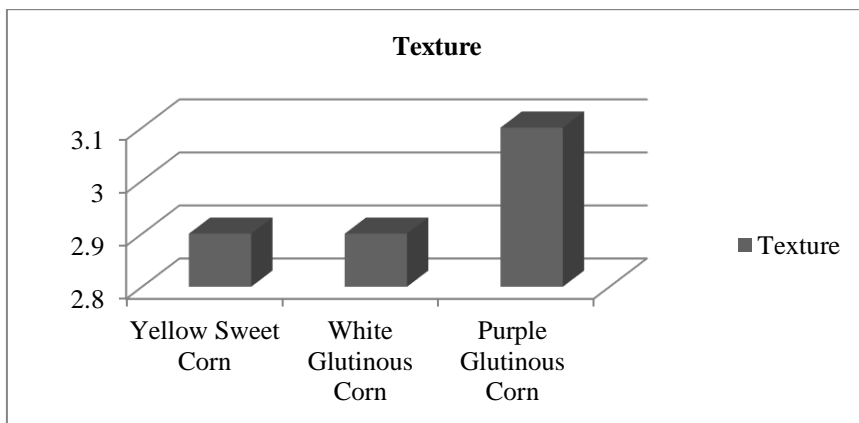


Fig. 4. Score of corn texture.

The highest score for texture is the purple glutinous corn followed by white glutinous corn and yellow sweet corn. The texture of sticky on corn is preferable for the panelist. The results of the organoleptic texture test of 3 types of corn with one way ANOVA can be seen in Table 7.

Table 7. One Way Anova Test results on textures of 3 types of corn.

	Model	Sum of Squares	df	Mean Square	F	Sig.
Texture	Between Groups	.800	2	.400	1.000	.372
	Within Groups	34.800	87	.400		
	Total	35.600	89			

Based on Table 6, it can be explained that the preference for the texture of 3 types of corn has no significant effect (significantly, this is indicated by a significant level of 0.372 (> 0.05), although the texture of the purple *pulut* corn is fluffier (smooth) while the white *pulut* corn is lighter. sticky (wetness) and fibrous (coarse) yellow sweet corn, this is figured by the carbohydrate, water, fat and protein contained in the 3 types of corn. [22] wrote that the texture of food is generally completed by water, fat, protein, and carbohydrates. Texture is a sensation of strain which is observably by mouth or touched with the fingers. Texture sensing varies, including wet, dry, hard, smooth, rough and oily.

4 Conclusions and recommendations

Based on the results of the organoleptic test with one-way ANOVA, it showed that the panelists' assessment of 3 types of corn gave a significant (significant) difference in color and flavor, while the texture and aroma parameters were not significantly different (not significant). Furthermore, Duncan's test was carried out on significantly different parameters, so the most preferred colors were purple glutinous corn, the most preferred flavor was yellow sweet corn,

Further research needs to be done by processing the 3 types of corn into processed food ingredients, as well as examining the content of each type of corn, in order to know which type of corn is best for health.

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