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Study of Utilization of Bak Choy Stems (Brassica Rapa Var. Chinensis) as Sweets with Variations of Coconut Sugar to Empower the Community of Ngrombo Tourism Village, Baki, Sukoharjo

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Abstract

This study aims to examine the manufacture of sweets from bak choy stems as a diversification of hydroponic waste products in Ngrombo Tourism Village, Sukoharjo. In addition, this study also aims to evaluate the quality of candied bak choy sticks with coconut sugar variations through organoleptic tests that include aspects of liking, color, taste, aroma, and texture. The method used in this study is an experiment with a quantitative approach. The research was carried out by making candied bak choy sticks using two variations of sugar, namely coconut sugar and granulated sugar. Confectionery quality data was analyzed using an organoleptic test to describe the characteristics of respondents, as well as a posttest-only control Group to determine the influence of sugar variations on confectionery quality. The results showed that there was a significant influence of sugar variations on the quality of candied bak choy sticks, especially in the color aspect. Although the differences in the aspects of liking, taste, aroma, and texture were not significant, candied bak choy sticks with coconut sugar variations were preferred by most respondents compared to sugar variations. This study also shows that the processing of bak choy stem waste into sweets can increase the economic potential of the people of Ngrombo Village.

Keywords: candied bak choy, coconut sugar variations, product diversification, ngrombo tourism village.

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INTRODUCTION

Ngrombo Village, which is located in Baki District, Sukoharjo, Central Java, is one of the tourist villages known as Ngrombo Baki Guitar Tourism Village. This village is not only famous as a producer of wooden musical instrument crafts in the form of guitars but also takes advantage of local potential to develop product diversification based on local (Ardhana & Hakim, 2024; Surya et al., 2024) wisdom one (Swesti et al., 2020). One of the innovations carried out is the development of community-based tourist destinations that integrate the creativity of local residents with the potential of the creative economy. As part of community development and participatory-based tourism management, Ngrombo Village created the Jebol Embankment Park (T2J) as one of the main attractions. This park is equipped with various tourist spots, one of which is a hydroponic park, which is a medium of education and community empowerment. This effort is supported by community service activities that

process hydroponic crops, such as bak choy, into processed products typical of T2J. This diversification not only reduces waste but also creates new sources of income for villagers. (Sari et al., 2023) (W. T. Hastiningsih et al., 2023) . Furthermore, educational programs related to waste treatment and MSME management are a strategic step in supporting the village's creative economy by involving the active participation of the community in tourism management (Mastuti et al., 2021; Putu Eka Pasmidi Ariati et al., 2024; Semara & Arianty, 2022; Swesti et al., 2020). In the context of sustainability and management of local resources, awareness of the importance of environmental protection is an aspect that is also developed. The use of used materials for selfie spots and typical culinary based on local ingredients is the main attraction of village tourism In addition, a participatory planning strategy is applied in the development of community-based tourism, which emphasizes the direct involvement of residents in creating authentic and sustainable tourism experiences (Swesti et al., 2020) (Langda et al., 2024).

A tourist village, as defined by Tuwuh Adhistyo W, is a rural area that offers an authentic atmosphere of the countryside in various aspects, including social life, culture, customs, and a unique and interesting local economy (2022) . In line with this concept, Ngrombo Village continues to innovate in creating tourist destinations based on used materials and hydroponic plants Hydroponic systems allow the cultivation of plants such as bak choy without soil media so that they are efficient and environmentally friendly Diversification of hydroponic harvest products is a strategic step to increase its economic value, such as processing bak choy stems into snacks or typical sweets that can extend shelf life and add selling value (Rahmat, 2020; Suhardi et al., 2024) . With the treatment of agricultural waste, not only new jobs are created, but also support sustainable agriculture and local resource efficiency (Papargyropoulou et al., 2014; Suhardi et al., 2024) The processing of food products based on local ingredients that are easy to obtain in the village is also an important step in increasing the added value of agriculture and supporting food tourism (Darfon, 2018; Kuningan et al., 2019) Bak choy as the main ingredient has a high nutritional content, including vitamin C, provitamin A, iron, magnesium, and calcium, and can grow in various environmental conditions (Ratu et al., 2023; Yohanna et al., n.d.) The use of bak choy stems, which are usually wasted as raw materials for sweets, is an innovative solution in supporting the concept of zero waste while increasing the economic value of local products (Rajesh et al., 2010) Making sweets is one of the processing methods for the abundance of products so it can become a new processing (Rahmat, 2020) This sweet product not only provides new business opportunities for the village community but also has the potential to become a culinary icon typical of Ngrombo Village that is attractive to tourists (W. T. Hastiningsih et al., 2023).

The use of coconut sugar as a natural sweetener is healthier than cane sugar (Ayuningtyas, 2022) The combination of bak choy sticks with coconut sugar produces unique and high nutritional value candied products so that this bak choy stick candied product can become a new culinary icon in Ngrombo Village that attracts tourists and provides added value both economically and culturally. Educating the community on crop diversification also strengthens local identity and opens up new market opportunities (W. Tri Hastiningsih et al., 2023) . To ensure the competitiveness of products in the market, sensory evaluations are carried out on the characteristics of taste, aroma, texture, and color of candied bak choy stems. This organoleptic testing process involves panelists identifying consumer preferences and

adjusting product formulations to be more accepted in the market The use of coconut sugar as a natural sweetener is also an innovative option that is healthier than cane sugar so that it can increase the selling value and attractiveness of the product for tourists who prioritize a healthy diet With a combination of local food-based product innovation and the right marketing strategy, Signature products such as Batang Bak Choy sweets can contribute to strengthening the culinary identity of Ngrombo Village as well as attracting more tourists to visit and enjoy community-based tourism experiences and sustainability (Rahayu & Nurosiyah, n.d.; Susetyowati et al., 2020).

RESEARCH METHOD

1. Experiment
   This study uses an experimental approach to process bak choy stems into candies with coconut sugar variations and evaluate their quality. In this method, treatment is given to the raw material (bak choy stick), with the parameters observed including taste, texture, aroma, color, and consumer preference. In this study, using
2. Quantitative Approach
   Organoleptic data was measured using a Likert scale through an organoleptic test (consumer panel) to obtain quantitative data related to the level of preference for products
3. The variables in this study are free variables, namely by using variations of java sugar and paasir sugar and bound variables, namely the quality of sweets seen from color, taste, texture and aroma and variable control, namely the type and number of ingredients used, tools used, manufacturing processes with the same treatment to mixing during cooking and drying.
4. Research design
   The design used in this study is a post-test only *pseudo-experimental design*. To do so, the researcher assigns an action to an independent variable and then measures how the treatment impacts the dependent variable.

R	X	O1
R	-	O2

Figure 1. *Posttest Only Control Group*
Source: Adiputra *et al.*, (2021)

Information:
X : Javanese Sugar Variation Group
- : Sugar Variation Group
O1, O2 : Observation results between the two groups
R : Group

RESULT AND DISCUSSION

Previous research on the fermentation of bak choy salted mustard shows that the processing of bak choy raw materials can produce innovative products, such as dried salted mustard, which has added value in terms of taste and shelf life This study supports the argument that bak choy stems as hydroponic waste can be processed into products of economic

value, such as candies, The use of bak choy stems as raw materials for sweets supports the concept of (Ratu et al., 2023) zero waste, as revealed in another study that encourages the processing of agricultural waste into value-added products to reduce waste and increase the economic potential of the community. In the fermentation of bak choy salted mustard, the use of additives such as NaCl and drying temperature affects the physical and chemical properties of the product (Ratu et al., 2023). This is in line with the research of bak choy bars as sweets, where the variations of coconut sugar and granulated sugar show a significant influence on the color quality of the product, although the aspects of taste, aroma, and texture are not too different. Both studies show the importance of process parameters in determining the final quality of the product. The research was conducted from May to June 2024 with the research subject Batang Bak choy (Brassica rapa var. chinensis). An experiment to make candied pokcay sticks with coconut sugar variations has been successfully carried out. Here is the manufacturing process.

Table 1. Steps to Make Candied Bak choy Sticks with Coconut Sugar

Step	Description
1. Preparation	– Wash the bak choy stems, cut them into 5-7 cm lengths. Soak in betel lime water for 5 hours
2. Early Boiling	– Boil the bak choy sticks in salt water for 3-5 minutes. Blanching with cold water.
3. Sugar Syrup	– Dissolve coconut sugar and granulated sugar in water. Add pandan leaves.
4. Soaking	– Add the bak choy sticks to the syrup, cook until the solution is absorbed.
5. Drying	– Drain and dry in the sun or dry in the oven.
6. Storage	– Store sweets in an airtight container.

Source: Research Results 2024.

Who were willing to be a respondent and follow the research procedure until the final stage as many as 35 people from Ngrombo Village, Baki, Sukoharjo. Then, data on the quality of sweets given with tamarind sugar and granulated sugar was taken.

1. Univariate Analysis Results

   The univariate analysis in this study was the characteristics of the respondents, which included age, gender, occupation, quality of sweets given variations of java sugar, and quality of sweets given variations of granulated sugar.

   a. Respondent Characteristics by Age

   Table 2. Respondent Characteristics by Age

Age	Sum	Percentage
17-25 years old (Teens)	12	34,3%
26-45 years old (Adult)	12	34,3%
46-65 years old (Senior)	11	31,4%
Entire	**35**	**100,0%**

   Source: Computerized data.

   Based on Table 2, it shows that the respondents of this study are dominated by adolescent and adult age groups, namely 12 people each or 34.3%.

b. Respondent Characteristics by Gender

Table 3 Characteristics of Respondents by Gender

Gender	Sum	Percentage
Man	8	22,9%
Woman	27	77,1%
Entire	**35**	**100,0%**

Source: Computerized data.

Based on Table 3, it shows that the majority of respondents in this study are women, namely 27 people or 77.1%.

c. Respondent Characteristics Based on Occupation

Table 4 Characteristics of Respondents by Job

Work	Sum	Percentage
Housewives	9	25,7%
Self employed	10	28,6%
Private Employees	5	14,3%
Students/Students	11	31,4%
Entire	**35**	**100,0%**

Source: Computerized data.

Based on Table 4, it shows that the majority of respondents in this study are students, namely 11 people or 31.4%.

d. Quality of Candies with Variations of Javanese Sugar and Granulated Sugar

Table 5 Quality of Candies with Variations of Javanese Sugar and Granulated Sugar

No	Quality of Sweets	Javanese Sugar Variations		Variations of Granulated Sugar	
		Average	Valuation	Average	Valuation
1.	Favorite	2,9	Like	2,8	Like
2.	Color	1,3	Not green	2,4	Somewhat green
3.	Taste	2,9	Sweet	2,8	Sweet
4.	Aroma	2,3	Quite like	2,5	Quite like
5.	Texture	2,5	Slightly chewy	2,4	Slightly chewy

Source: Computerized data

Based on Table 5, it shows that the quality of sweets given sugar variations is only in color, which has a fairly high average value difference when compared to Javanese sugar variations, with a difference of 1.1. Visually, it can be displayed in the following graph:

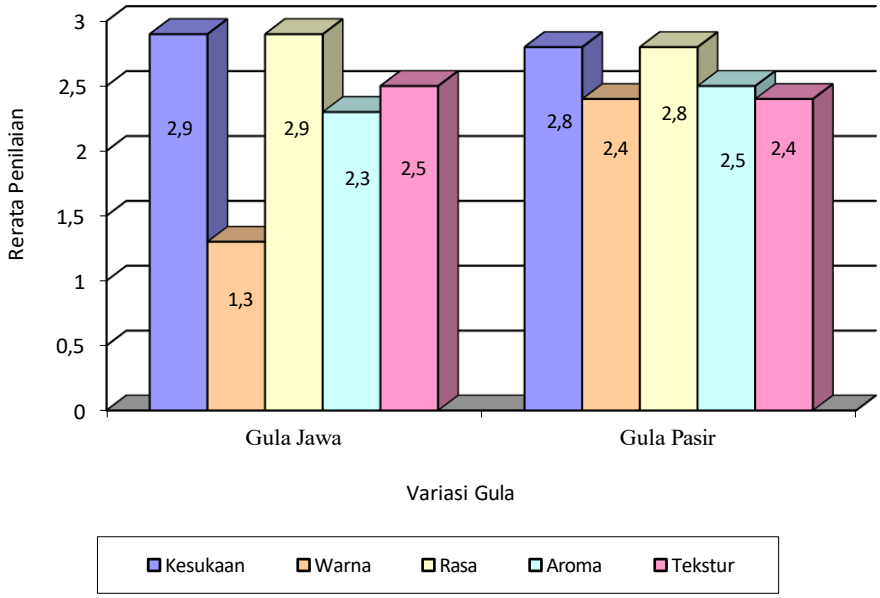

Figure 2. Comparative Graph of Sugar Variation Against the Quality of Confectionery

2. Results of Bivariate Analysis

The bivariate analysis in this study was to analyze the effect of sugar variations on the use of Bak choy Stems (Brassica rapa var. chinensis) as sweets.

Table 6 Results of *Multivariate Test* of Sugar Variation with Sweets Quality

Variable	n	Sig. (p-value)	Criterion	information
Sugar Variations	35	0,000	< 0.05	Ha accepted

Source: Computerized Data

Based on Table 5, it is known that the p-value = 0.000 which is less than the alpha value (p-value < 0.05) then Ha is accepted, so it can be concluded that overall there is a significant influence of the variation between tamarind sugar and sand sugar on all sweets qualities which include: preference, color, taste, aroma, and texture.

Table 7 *MANOVA Test Results of* Sugar Variation with Confectionery Quality

Independent Variables	Dependent Variables	Sig. (p-value)	Criterion	information
Sugar Variations	Favorite	0,745	> 0.05	Ha rejected
	Color	0,000	< 0.05	Ha accepted
	Taste	0,557	> 0.05	Ha rejected
	Aroma	0,304	> 0.05	Ha rejected
	Texture	0,697	> 0.05	Ha rejected

Source: Computerized data

Based on Table 7, it is known that the sugar variation for color has a p-value (Sig.) < 0.05, then Ha is accepted, which means that there is a real/significant difference in color between the variation of tamarind sugar and sand sugar. Meanwhile, in taste, taste, aroma, and texture, there is no difference between the varieties of tamarind sugar and sand sugar.

CONCLUSION

1. The experiment of making sweets from bakchoy stems with a variant of coconut sugar has been successfully made. Candied bak choy sticks are an excellent solution for reducing waste from the produce by making bak choy snack sticks. In addition, it participates in empowering the surrounding community in its processing so that it becomes an economic value that can be sold as a typical T2J souvenir in Ngrombo Village and has participated in empowering.
2. The quality of sweets given a variety of granulated sugar is only in color that has a difference when compared to the variation of java sugar with an average difference of 1.1.
3. Overall there was a significant influence (p-value < 0.05) of the variation between tamarind sugar and granulated sugar on all confectionery qualities which included: preference, color, taste, aroma, and texture.
4. There was a real/significant difference (p-value < 0.05) in color between the variation of tamarind sugar and sand duan. Meanwhile, in taste, taste, aroma, and texture there is no difference between the variety of tamarind sugar and sand sugar.

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