

SUSTAINABLE DEVELOPMENT THROUGH THE USAGE OF LOCAL INGREDIENTS IN BISCUIT PRODUCTION IN SRI LANKA: A CASE OF MAKING COOKIES WITH CASSAVA AND GREEN GRAM FLOUR

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Abstract

Cookies, otherwise known as biscuits, are a popular cereal food. Wheat flour is the main ingredient in making cookies which is mainly imported by Sri Lanka. Hence, this study focused on developing a value-added cookie using composite flour of cassava and green gram, instead of wheat flour to encourage utilization of local inputs and reduce importation, which leads to the sustainable development in the country. Cookies were made with a composite flour of wheat, cassava, and green gram using different ratios as 120:30:0, 150:0:0, 0:150:0, 45:75:30, 75:60:15, and 0:120:30. The best combination was determined by sensory scores. Results have shown that the 75:60:15 ratio gave the highest scores. The selected sample was subjected to proximate analysis and results revealed that moisture, ash, fat, protein, carbohydrates, and energy were 2.8%, 1.3%, 17.0%, 5.0%, 73.9%, and 468.6 kcal/100g respectively. Thus, the best formulation of the composite flour mixture for cookies is 75:60:15.

Keywords: *Cassava, Green gram, Composite flour, Value added cookie, Sustainable development.*

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Introduction

Cookies, otherwise known as biscuits, are popular cereal foods, commonly consumed by the populace as a ready-to-eat food item (Adekunle & Marya, 2014). It is one of many baked products often made with wheat flour. (Soedirga et al., 2021). However, the consumption of wheat flour is not very healthy (Chakrabarti et al., 2017).

Further, wheat flour is the main ingredient for cookies which is mainly imported to Sri Lanka. Approximately \$250 million in wheat have imported by Sri Lanka in 2020 (Sri Lanka Country Commercial Guide, 2021). Therefore, composite flour which is produced by using locally grown crops and high protein seeds like cassava (Nilusha et al., 2019) and green gram (Wijesinghe, 2015) totally or partially replaced with wheat flour is decreasing sole dependency on wheat flour and give the solution for foreign reserve burden in the country.

Hence, there is a huge opportunity to give a better market for local products by preparing a value-added cookie and reducing the importation of wheat flour for a sustainable Balance of Payment to accomplish sustainable development in the country. Therefore, as it is difficult to find relevant literature, studying the possibility of developing a cookie using composite flour from cassava and green gram flour and also the best ratio of these ingredients are timely important.

Material and Methods

Table 1:

Experimental plan of different ratios

Types	Sample % (150*)	WF(g)	CF(g)	GF(g)
01	4:1:0	120	30	00
02	1:0:0	150	00	00
03	0:1:0	00	150	00
04	3:5:2	45	75	30

05	5:4:1	75	60	15
06	0:4:1	00	120	30

Note. Different ratios of wheat flour, cassava flour, and green gram flour were used for the preparation of cookie samples Table 1.

Conducting the sensory evaluation

Sample Size: 30 Panel members and 70 other respondents.

Data Collection Method: Using a seven-point hedonic scale.

Sampling Technique: Simple random sampling

Data Analysis Methods: Analysis of Variance and Duncan Post Hoc Analysis

Results and Discussion

Table 2:

Mean scores for sensory evaluation

	Ap pe ara nc e	Taste	Arom a	Color	Mout h feel	Textu re	Overall Acceptabi lity
Type 1	3.27±1.7	2.58±1.6	2.79±2.0	3.21±1.6	2.62±1.4	2.48±1.6	2.63±1.4
Type 2	4.11±2.0	3.71±1.5	3.26±1.4	3.61±1.7	3.65±1.8	3.75±2.0	3.41±1.4
Type 3	2.94	3.78±1.4	3.21±1.7	3.79±1.8	3.63±1.5	3.96±1.7	3.78±1.7

		±1					
		.7					
Type 4	3.	3.46±	4.62±	4.79±	3.55±	3.80±	4.21±1.3
	96	1.5	1.4	1.3	1.5	1.5	
		±1					
		.5					
Type 5	4.	5.11±	4.33±	4.46±	5.35±	4.52±	5.62±1.9
	66	2.0	1.8	1.7	1.5	1.5	
		±1					
		.8					
Type 6	2.	2.64±	3.54±	2.59±	2.48±	2.64±	2.18±1.3
	74	1.7	2.0	1.2	1.5	1.4	
		±1					
		.5					

Note. Results of the sensory evaluation are presented in table 2.

^aType 5 (75/60/15) sample shows higher scores for appearance, taste, mouth feel, texture, and overall acceptability among other types.

^bHence, there is a significant difference between sensory attributes and cookie samples, and also all the variables are significant at ($p < 0.05$) level.

Table 3:

Post Hoc Analysis Tukey HSD

Dependent Variable: Overall acceptability

(I) Type of cookie	(J) Type of cookie	Mean difference (I-J)	Std. error	Sig.
Type 5	Type 6	3.440*	.214	.000
	Type 3	1.840*	.214	.000
	Type 2	2.210*	.214	.000

Type 4	1.410*	.214	.000
Type 1	2.990*	.214	.000

Note. Duncan's Post hoc test result for pairwise comparison is shown in Table 3.

^aThe effect of cookie type on the overall acceptability by concerning two cookie types at once.

^bThe mean difference of overall acceptability between type 5 (75/60/15) and all other cookie types is significant at 0.05 level.

Table 4:

Proximate Analysis Results

Tests	Result	Acceptability
Moisture	2.8%	All these values are in line with the Olapade et al.,2014, Soedirga et al., 2021 and Chakrabarti.T et al., 2017 and www.malibangroup.com , www.cblk.com and www.cargillsceylon.com ,
Ash	1.3%	
Fat	17.0%	
Protein	5.0%	
Carbohydrate	73.9%	
Energy (as kcal/100g)	468.6kcal/100g	

Source: IDB-SGS FOOD LABORATORY- Sri Lanka and websites of Manchee, Maliban, and Kist

Note. Proximate analysis results and acceptability of the selected cookie sample are shown in Table 4.

Conclusion and Recommendations

The findings revealed that the most preferred sample is the Type 5 cookie sample (75:60:15) of wheat, cassava, and green gram flour. Considering sensory evaluation, most of the consumers have given high scores for Type 5 cookie samples regarding appearance, taste, mouth feel, texture, and overall acceptability. Hence, it was concluded as the most preferred sample is Type 5 (75:60:15). Further, proximate results of the selected cookie sample revealed that Moisture, Ash, Fat, Protein, Carbohydrate, and Energy tests values are at

suitable levels. Hence, a composite flour ratio of 75/60/15 is the best formulation to make cookies and it can support the sustainable development of the country up to a significant level by using locally grown crops of cassava and green gram instead of sole dependency on imported wheat flour.

To attain the sustainable development of the country, government sectors, as well as private sector focus, should be given to produce composite flour using cookies like widely consumed value-added products at the commercial level according to consumer expectations. It helps to gain sustainable development mainly in three ways. While it can reduce wheat flour importation, saving lots of foreign exchange, it can support local farmers to get a better income for their cassava and green gram. Moreover, it can support the value addition of two agricultural products and some job opportunities for local people creating some rural businesses. Also, consumers should be acknowledged the advantages of value-added products which are prepared with locally available ingredients and the importance of consumption of those products.

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