

# Product development and sensory evaluation of acceptability of *Kuih Bingka Ubi* (Baked Tapioca Cake) made with Isomaltulose amongst IMU students and staffs.

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## Introduction

- Sweet traditional Malay *kuih* were highly eaten by local Malaysians. [1]
- Rooted the concerns of Malaysians excessive intake of extrinsic sugar in a long run. [2, 3]
- Sugar substitutes were highly researched in terms of producing healthier local *kuih*. [4, 5]
- Isomaltulose (IM) is a functional carbohydrate which was highly approved and researched internationally over substitution in recipe. [6, 7]

In local, limited research and studies were done on the feasibility of the sweet Malay traditional Malay *Kuih*.

## Objectives

To analyze the rate of acceptability of subjects over developed *Kuih Bingka Ubi* recipes sweetened with sucrose and IM via 5-point hedonic and Just About Right (JAR) scale.

## Methodology

### Phase 1 Development stage

- Kuih Bingka Ubi* recipe was searched online, per serving is 20g [8]
- Carbohydrate content contributes by sugar from original recipe was 43.1%

#### Sugar Ratio and Sensory Label

- 100% sucrose = 904 ;
- 50% sucrose to IM = 185 ;
- 100% IM sugar = 473



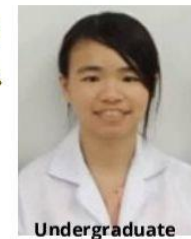
#### Serving of *Kuih Bingka Ubi*

- Bottled water
- Online Questionnaire

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Undergraduate

## Phase 2 Sensory Evaluation

- Convenience (pre-screened) and
- Purposive Sampling (walk in participants)
- Sample Size: N=37 (31 Female, 6 Male ; 19 Malay, 16 Chinese, 2 Indian)
- Inclusion Criteria :
  - Local Malaysian adults resided near IMU BJ campus
  - Aged between 18 to 45, at KL
  - Free of diabetic conditions, and not allergy to milk or egg.
- Exclusion Criteria
  - Heavy smokers (25 and more smokes / day)
  - Heavy alcoholic (8 standard drinks / day)[9, 10]
- Hedonic scale
  - Scale 4 and 5 will be considered
- Just About Right Scale (Scale 3 will be considered)

## Phase 3 Statistical Analysis

- SPSS (Statistical Package for Social Science)
- Cross Tab analysis
- P-values generated from Kruskal- Wallis test
- Mann-Whitney test (non-parametric data)
- Shapiro-Wilk test for p-value less than 50 (n=37)
- Significance level = p<0.05

#### 5- Point Hedonic Scales

- Extremely Dislike it = 1
- Moderately Dislike it = 2
- Neither like nor dislike it = 3
- Moderately Like it = 4
- Extremely Like it = 5

#### Just About Right Scale (JAR)

- Not Enough = 1
- Moderately not enough = 2
- Just About Right = 3
- Moderately too sweet = 4
- Extremely too sweet = 5

## Discussion

## Results

Table 1: Comparison of Means of Sensory Attributes across the three samples

Attributes	Sample	Percentage (%)
Sweetness	50% Sucrose to IM	70
	100% IM	76
	100% Sucrose	62
Appearance	50% Sucrose to IM	84
	100% IM	78
	100% Sucrose	54
Aroma	50% Sucrose to IM	65
	100% IM	84
	100% Sucrose	62
Taste	50% Sucrose to IM	70
	100% IM	81
	100% Sucrose	76
Texture	50% Sucrose to IM	65
	100% IM	86
	100% Sucrose	68
Overall	50% Sucrose to IM	56.76
	100% IM	48.64
	100% Sucrose	35.14

Table 2: Affective Test For all the Sample *Kuih Bingka Ubi* by percentage. (50% Sucrose to IM, 100% IM, 100% Sucrose.)

Sensory Attributes	Variation	Mean(SD)	p-value
Sweetness	50% Sucrose to IM	2.76±0.53 a	<0.01
	100% IM	3.41±0.93 b	
	100% Sucrose	3.68±0.97 b	
Appearance	50% Sucrose to IM	3.95±0.38	0.587
	100% IM	3.92±0.92	
	100% Sucrose	3.62±1.23	
Aroma	50% Sucrose to IM	4.08±0.36 a	0.032
	100% IM	4.14±0.89 a	
	100% Sucrose	3.59±1.04 b	
Taste	50% Sucrose to IM	3.78±1.11	0.096
	100% IM	4.19±1.02	
	100% Sucrose	3.76±1.04	
Texture	50% Sucrose to IM	3.92±0.92	0.063
	100% IM	4.19±1.00	
	100% Sucrose	3.81±0.81	
Overall Acceptability	50% Sucrose to IM	3.78±1.07 a	0.020
	100% IM	4.23±0.90 a	
	100% Sucrose	3.73±1.02 b	

\*P-values calculated using Kruskal Wallis Test  
\*Columns with different alphabetical subscripts are significantly different in Mann-Whitney Test

Sensory Attributes, Overall Acceptability and Just About Right Sweetness between Samples.

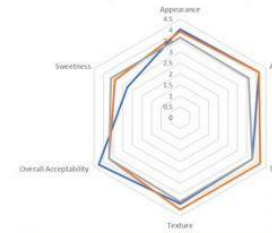


Figure 1: Radar chart visualize the sensory attributes, overall acceptability rated as "preferred" (ratings 4 to 5) and Just About Right Sweetness (rating 3) between the three samples.

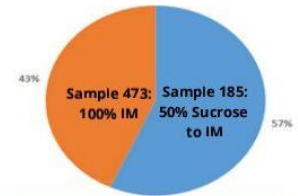


Figure 2: Distribution of participant choice collected from Duo-trio test in the identification of sample closest to the reference R. (n=37)

**Appearance :** IM is a strong reducing sugar, which will generate stronger and intensive browning effects under the baking temperature of 180 degree Celsius compared to sucrose. [11,12] Thus the appearance was improved with better colour contrast.

**Aroma :** IM included sugar variation will produce stronger burnt and browning effects, in which it is possible to generate stronger off-flavour, which the aroma is having differences compared to 100% sucrose sample. [11, 13, 14]

**Taste :** The uniform and even taste of IM was successfully used in this selected *kuih* recipe, whereas the sweetness was adequate to sweeten each samples. [12, 15]

**Texture :** The effects of hygroscopicity and crystallization from sucrose and IM was identified as factors to softer *kuih*, but this results was not shown in this research. [12] As it was assumed to be affected by extended cooling period in the lab.

**Overall Acceptability :** The usage of IM as a sweetener in *Kuih Bingka Ubi* is as acceptable as the results generated from A. Periche et al and Tavera-Quiroz et al. [16, 17]

**Sweetness :** Sweetness preference was different amongst ethnic, gender and age groups. [15] However, all the IM included sugar ratio was well accepted as the original recipe too.

**Duo-trio Test :** Limited differences rated by participants shown the limited difference and feasibility of *Kuih Bingka Ubi* being sweetened with IM and sucrose. Similar results was shown from Golob et al. [18]

## Conclusion

Positive results was generated from all IM sweetened *kuih Bingka Ubi*. IM included *Kuih Bingka Ubi* was also accepted as 100% sucrose sample from Duo-Trio test. As IM sample own highest ratings for 4 out of 5 attributes from 5-point hedonic, the usage of IM in Malay *Kuih* is possible and suggested for future trials.

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