

Javanese Tamarind Solution and Palm Sugar Concentration

Preferred Levels in Spicy Fried Dry Potato and Shrimp Sambal

Dwi Kristiastuti Suwardiah
Department of Home Economic
Universitas Negeri Surabaya4
Surabaya, Indonesia
dwikristiastuti@unesa.ac.id

Abstract—This research analyzed the preference levels of panelists toward the characteristics of six varieties of *sambal goreng* according to the following parameters: color, taste, stickiness, crispiness, preference, and test nutritional contents were also determined using chemical tests. The data, analyzed using Anova test, yielded the following means of panelist scores: 3,40 for color; 3,23 for taste; 3,57 for stickiness; 3,33 for crispiness, and 3,37 for their overall preference on a 4-point scale.

Keywords—*castor sugar; javanese tamarind; panelists' preference; spicy fried dry sambal*

I. INTRODUCTION

This was an experimental research with the aim of analyzing the effects of sugar amount and Javanese tamarind solution concentration toward the organoleptic characteristics of spicy fried dry potato and shrimp *sambal* which includes the color, taste, stickiness, crispiness, and preference.

Fried dry potato *sambal* is categorized to side dish of *sambals* according to the Indonesian dish categorizations. *Sambal* is a dish with chili or cayenne pepper as the main ingredient, causing it to have hot taste. *Sambal* is divided into the following types: 1) *sambal mentah* (*sambal* made of uncooked ingredients), 2) *sambal matang* (*sambal* made of cooked ingredients), and 3) fried *sambal*⁵.

Sambal can be developed to undried and fried dry *sambal*. Furthermore, *sambal* can be served as main or side dish. *Sambal* ingredients can be developed from chilies as the main ingredients added by various sources from plants or animals. Ingredients from plants are such as: tubers (potato, taro, yam, etc.) and beans. Ingredients from animal are such as anchovies, shrimps, and dried shrimps².

The criteria for fried dry potato *sambal* are being crispy and dry, while the ingredients are tacked to each other because of sugar and Javanese tamarind solution addition. The color of fried dry potato *sambal* is red or orange from the chili pepper, sugar, and Javanese tamarind solution³. Fried dry potato and shrimp *sambal* is condiment to spiced rice such as *uduk* rice, yellow rice, or savory rice.

II. METHODS

The experimental research about sugar and Javanese tamarind solution effects toward the organoleptic characteristics of fried dry potato and shrimp *sambal* was arranged in a food processing laboratory. The data collection technique used observation to products through an organoleptic test by 30 panelists who are experts in culinary arts. The organoleptic test includes: color, taste, stickiness, crispiness, and preference. The collected data were analyzed using SPSS program and ANOVA techniques. The research design is as follows:

TABLE I. RESEARCH DESIGN

Sugar	Javanese Tamarind Solution		
	X1	X2	X3
Y1	Y1X1	Y1X2	Y1X3
Y2	Y2X1	Y2X2	Y2X3

Note:

X1 – X3 : Javanese tamarind solution concentration in milliliters

Y1 – Y2 : Amount of palm sugar in grams

The best product were then sent for a chemical test in a food laboratory to observe the nutrition contents such as Carbohydrate, fat, protein, calcium, vitamin A, ash, fiber, and water content.

Making process of *sambal* include the ingredients are potato sticks, ebi/dry shrimp, and seasonings are garlic powder, chilli puree, brown sugar, javanese tamarind solution, salt, water, and oil. Then saute and mix the ingredients and the seasoning until done. After that, bring the spicy fried dry potato and shrimp *sambal* to test it in Laboratorium test (Proximat) and Organoleptic test.

III. RESULTS

A. Results of organoleptic test by the panelists are shown in the graphics below:

The mean values of the compositions between sugar and Javanese tamarind, which are: for the characteristic of **color**, the highest mean value is 3.4 which is for the composition of 70-40, while the lowest mean value is 2.4 which is for the composition of 60-20. For the characteristic of **taste**, the highest mean value is 3.23 which is for the composition of 60-20, while the lowest mean value is 2.23 which is for the composition of 70-40. For the characteristic of **stickiness**, the highest mean value is 3.57 which is for the composition of 70-30, while the lowest mean value is 2.33 which is for the composition of 60-30. For the characteristic of **crispiness**, the highest mean value is 3.33 which is for the composition of 60-20, while the lowest mean value is 2.5 which is for the composition of 60-40. For the characteristic of **preference**, the highest mean value is 3.37 which is for the composition of 60-20, while the lowest mean value is 2.53 which is for the composition of 70-40.

B. Results of ANOVA Test

The data analysis technique used Double Anova test in order to observe the product's organoleptic characteristics which include: color, taste, stickiness, crispiness, and preference.

C. Product's Color

TABLE II. TESTS OF BETWEEN SUBJECTS EFFECTS OF PRODUCT'S COLOR

Tests of Between-Subjects Effects					
Dependent Variable: Color					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	25,867 ^a	5	5,173	9,008	,000
Intercept	1584,200	1	1584,200	2758,347	,000
Palm Sugar	15,022	1	15,022	26,156	,000
Javanese Tamarind	8,633	2	4,317	7,516	,001
Palm Sugar * Javanese Tamarind	2,211	2	1,106	1,925	,149
Error	99,933	174	,574		
Total	1710,000	180			
Corrected Total	125,800	179			

. R Squared = ,206 (Adjusted R Squared = ,183)

According to the table, it is explained that the interaction between sugar and Javanese tamarind solution significantly affect the product's color.

The results of data analysis in Table II can be explained

that the assessment of the aspect of dried fried chilli color of potato ebi using the addition of palm sugar has a very different color difference where the mean value with the addition of palm sugar as much as 70 grams of 3.256 while the addition of palm sugar as much as 60 grams of 2,678 .

Further explanation about the effects of difference in the sugar and Javanese tamarind solution addition amount is shown in the table below:

TABLE III. VALUE OF DIFFERENCE OF PALM SUGAR TO COLORS OF DRY DRAWING POTATO EBI

Palm sugar	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
70 gram	3,256	,080	3,098	3,413
60 gram	2,678	,080	2,520	2,835

TABLE IV. PRODUCT'S COLOR

Color				
Javanese Tamarind		N	Subset	
			1	2
Duncan _{a,b}	20 ml	60	2,7500	
	30 ml	60	2,8833	
	40 ml	60		3,2667
	Sig.		,337	1,000

According to the table above, the amount of Javanese tamarind solution that appears in the subset 2 is 3,2667 which means the fried dry potato and shrimp *sambal* turned to the color orange due to 40 ml of Javanese tamarind solution addition.

D. Product's Taste

TABLE V. TESTS OF BETWEEN-SUBJECTS EFFECTS OF PRODUCT'S TASTE

Tests of Between-Subjects Effects					
Dependent Variable: Taste					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	18,628 ^a	5	3,726	4,292	,001
Intercept	1439,339	1	1439,339	1658,210	,000
Palm Sugar	2,939	1	2,939	3,386	,067
Javanese Tamarind	14,978	2	7,489	8,628	,000
Palm Sugar * Javanese Tamarind	,711	2	,356	,410	,665
Error	151,033	174	,868		
Total	1609,000	180			
Corrected Total	169,661	179			

R Squared = ,110 (Adjusted R Squared = ,084)

According to the table above, the amount of sugar does not affect the product's taste, with the F-statistics of 3,386 and Sig ,067 (more than 0,005), but the Javanese tamarind solution

affects the taste with the F-statistics 8,628 and Sig .000 (less than 0,005). Furthermore, the interaction of both sugar and Javanese tamarind solution does not significantly affect the product's taste, with F-statistics 410 and sig 665 (more than 0,005). Moreover, Duncan test showed results shown in the table below.

TABLE VI. PRODUCT'S TASTE

Javanese Tamarind		N	Taste	
			1	2
Duncan a,b	40 ml	60	2,4500	
	30 ml	60		2,8833
	20 ml	60		3,1500
	Sig.		1,000	,119

According to the table above, the amount of Javanese tamarind solution addition that appeared in the subset 2 with the value of 3,2667 and 2,8833, which concluded that the sugar and Javanese tamarind solution addition matched with the tamarind solution addition of 20 ml and 30 ml.

E. Product's Stickiness

TABLE VII. TESTS OF BETWEEN-SUBJECTS EFFECTS OF PRODUCT'S STICKINESS

Tests of Between-Subjects Effects					
Dependent Variable: Stickiness level					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	32,561 ^a	5	6,512	9,811	,000
Intercept	1542,939	1	1542,939	2324,427	,000
Palm Sugar	28,006	1	28,006	42,190	,000
Javanese Tamarind	,078	2	,039	,059	,943
Palm Sugar * Javanese Tamarind	4,478	2	2,239	3,373	,037
Error	115,500	174	,664		
Total	1691,000	180			
Corrected Total	148,061	179			

a. R Squared = ,220 (Adjusted R Squared = ,198)

According to the table above, it is concluded that sugar amount significantly affects product's stickiness, while the Javanese tamarind solution does not. Despite that, the interaction between both of sugar and Javanese tamarind solution very significantly affects the product's stickiness with Sig ,037. The results of Duncan test are shown in the table below:

TABLE VIII. VALUE DIFFERENCE VARIATION OF PALMSUGAR TO EXPOSURE TO DRAGON WITH DRY WHEEL POTATO EBI

Palm Sugar	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
70 gram	3,322	,086	3,153	3,492
60 gram	2,533	,086	2,364	2,703

The results of data analysis in Table VIII can be explained that the assessment of the stickiness aspect of dried fried sambal potato ebi by using the addition of palm sugar has a difference of very different adhesiveness where the mean value with the addition of palm sugar as much as 70 grams of 3.322 while the addition of palm sugar as much as 60 grams of 2,533.

F. Product's Crispiness

TABLE IX. TESTS OF BETWEEN-SUBJECTS EFFECTS OF PRODUCT'S CRISPINESS

Tests of Between-Subjects Effects					
Dependent Variable: Crispiness level					
Source	Type III Sum of Squares	Df	Mean Square	F	Sg.
Corrected Model	15,961 ^a	5	3,192	4,350	,001
Intercept	1439,339	1	1439,339	1961,198	,000
Palm Sugar	2,450	1	2,450	3,338	,069
Javanese Tamarind	11,478	2	5,739	7,820	,001
Palm Sugar * Javanese Tamarind	2,033	2	1,017	1,385	,253
Error	127,700	174	,734		
Total	1583,000	180			
Corrected Total	143,661	179			

a. R Squared = ,111 (Adjusted R Squared = ,086)

According to the table, sugar, Javanese tamarind solution, and the interaction of both of them significantly affect the product's crispiness. The results of Duncan test are shown in the table below:

TABLE X. PRODUCT'S CRISPINESS

Crispiness				
Javanese Tamarind		N	Subset	
			1	2
Duncan a,b	40 ml	60	2,5333	
	30 ml	60	2,8000	
	20 ml	60		3,1500
	Sig.		0,90	1,000

According to the table above, the amount of Javanese tamarind solution addition that appeared in the subset 2 with the value of 3,1500 is 20 ml, which means product is considered as crispy with Javanese tamarind solution addition of 20 ml.

G. Preference

TABLE XI. TESTS BETWEEN-SUBJECTS EFFECTS OF PREFERENCE

Tests of Between-Subjects Effects					
Dependent Variable: Preference level					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	15,867 ^a	5	3,173	4,674	,000
Intercept	1620,000	1	1620,000	2386,117	,000
Palm sugar	8,022	1	8,022	11,816	,001
Javanese Tamarind	6,700	2	3,350	4,934	,008
Palm sugar * Javanese Tamarind	1,144	2	,572	,843	,432
Error	118,133	174	,679		
Total	1754,000	180			
Corrected Total	134,000	179			

a. R Squared = ,118 (Adjusted R Squared = ,093)

According to the table, sugar, Javanese tamarind solution, and the interaction of both of them significantly affect preference.

TABEL XII. THE APPRAISAL OF THE ASPECT OF THE FRIED SAMBAL FRIES OF DRIED POTATOES WITH THE USE OF THE ADDITION OF PALM SUGAR

Palm sugar	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
70 gram	2,789	,087	2,617	2,960
60 gram	3,211	,087	3,040	3,383

The result of data analysis in Table XII can be explained that the appraisal of the aspect of the fried sambal fries of dried potatoes with the use of the addition of palm sugar has a very different preferences where the mean value with the addition of palm sugar as much as 70 grams of 2.789 while the addition of palm sugar as much as 60 grams of 3,211. The results of Duncan test are shown in the table below:

TABLE XII. PREFERENCE LEVEL

N	Preference Level	
	Subset	
	1	2
60	2,8167	
60	2,9167	
60		3,2667
	,507	1,000

According to the table above, the amount of Javanese tamarind solution addition that appeared in the subset 2 with the value of 3,2667 is 20 ml, which means product is more preferred with Javanese tamarind solution addition of 20 ml.

H. Chemical Test

Chemical test was arranged by using proximate test in a food laboratory. According to the chemical test results, the most preferred product has the composition of sugar and Javanese tamarind solution of 60-20, and the nutrition contents are including Vit A 14,80mg/100gr; mineral 38,5 mg/100 gr; fat 6,81%; protein 7,81%; carbohydrate 71,80%; fiber 3,86%; ash 6,24%; and water 3,18%.

IV. CONCLUSION

Fried dry potato and shrimp *sambal* is a condiment for spiced rice and it has the organoleptic characteristics of color for the composition, taste for the composition, stickiness for the composition, crispiness, and preference when it is added by 20 ml of Javanese tamarind solution. The most preferred product that has the composition of sugar and Javanese tamarind solution of 60-20, and it has the nutrition contents which include: Carbohydrate, protein, fat, calcium, vitamin A, fiber, ash, and water.

REFERENCES

- [1] Arikunto, Suharsimi. 2010. *Manajemen Penelitian*. Jakarta: Rineka Cipta.
- [2] Buckle, K.A. dkk. 1987. *Ilmu Pangan*. Jakarta: UI-PRESS.
- [3] Effendi, Samsu. 1993. *Ensiklopedi Tumbuh-tumbuhan*. Surabaya: Karya Anda.
- [4] George, Susan. (terj. Sandria Komalasari). 2007. *Pangan dari Penindasan sampai ke Ketahanan Pangan*. Yogyakarta: Insist.
- [5] Miles and A Michael Huberman. 1984. *Qualitative Data Analysis*. Beverly Hills: Sage Publications.
- [6] McNeely, Jeffrey A. 1992. *Ekonomi dan Keanekaragaman Hayati*, Jakarta: Sinar Harapan.
- [7] Soedarmo, Poerwo. 2010. *Ilmu Gizi*. Jakarta: Dian Rakyat.
- [8] Suyitno dkk, 1989. *Rekayasa Pangan* (Petunjuk Laboratorium). Yogyakarta: PAU UGM.
- [9] Wahono, Francis, dkk. 2004. *Pangan Kearifan Lokal dan Keanekaragaman Hayati*. Yogyakarta: Cindelarast Pustaka Rakyat Cerdas.
- [10] Weerachet, et al. "Production of tamarind powder by drum dryer using maltodextrin and Arabic gum as adjuncts". *Songklanakarin J. Sci. Technol.* 33 (1), 2011. Pp 33-41.
- [11] Ekpong, et al. "The effects of maltodextrin as a drying aid and drying temperature on production of tamarind powder and consumer acceptance of the powder". *International Food Research Journal* 23(1). 2016. pp 300-308.
- [12] Reinout, et al. "Tamarindus indica L. (Fabaceae): Patterns of use in traditional African medicine. *Journal of Ethnopharmacology*" 127.2010. Pp 573-588.
- [13] Deeraj, et al. "Processed product of tamarind. Natural product radiance", vol 6 (4), 2007. pp 315-321.
- [14] Srinivasan, et al. "A Study on Consumer Behavior towards Instant Food Products (With Special References to Kanchipuram Town)". e-ISSN: 2278-487X, p-ISSN: 2319-7668. Volume 16, Issue 11. Ver. III. November 2014, PP 17-21 . www.iosrjournals.org.